

# The Iron Age

A Review of the Hardware and Metal Trades.

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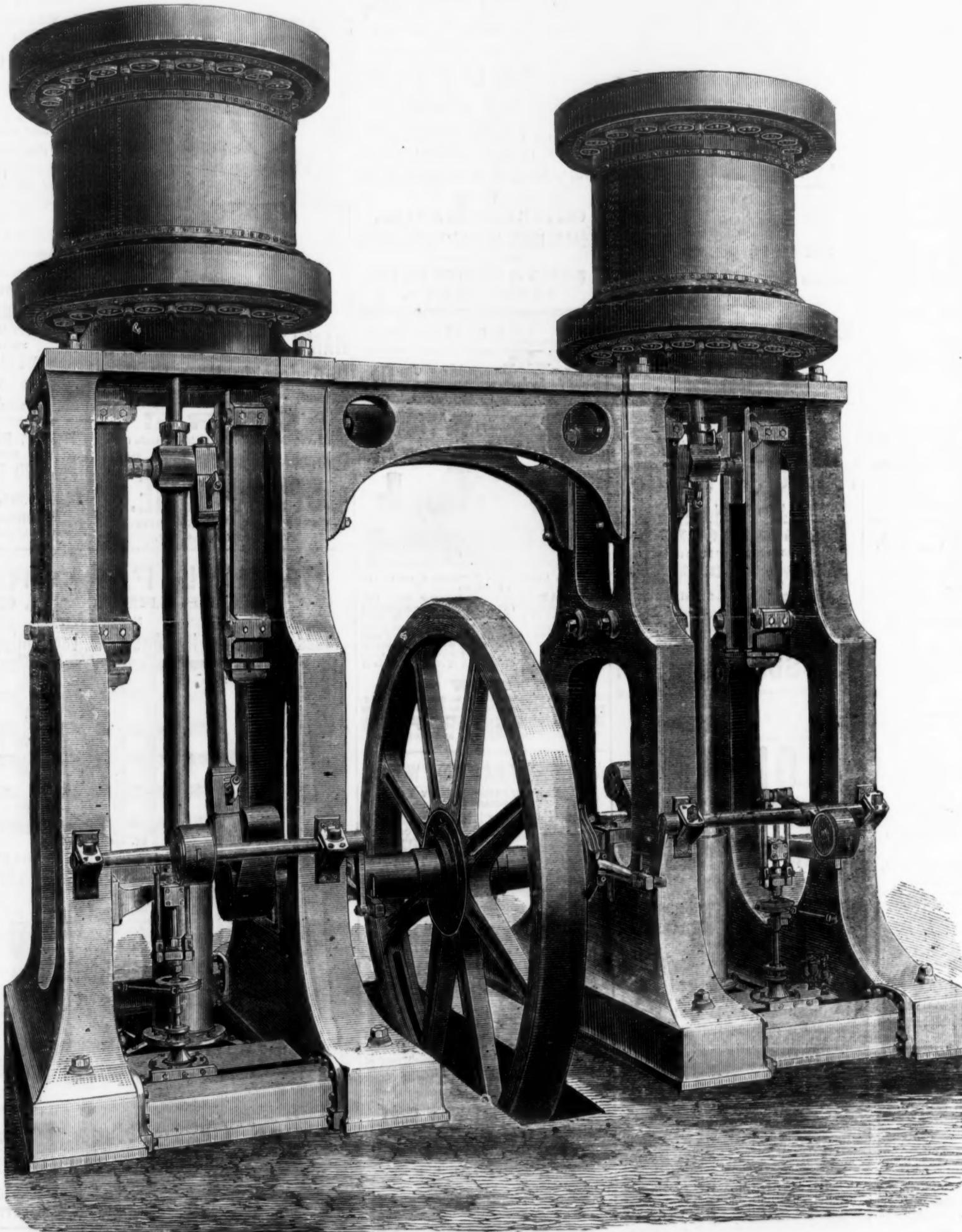
## Blowing Engines for Krupp's Steel Works at Essen.

We present herewith an unusually beautiful illustration of a pair of exceedingly fine blowing engines constructed by Messrs. W. & J. Galloway & Sons, Knott Mill Works, Manchester, for Herr Krupp, Essen, which appear to offer a number of novel features, and have evidently been designed with a view of getting as simple, substantial, and accessible an arrangement of parts as possible. The main framing consists of massive castings, and rests directly on the ashlar or brick foundation. To the underside of their frame are attached the steam cylinders, which, in the engine illustrated, are 40 in. bore and 5 ft. stroke. The pistons of these cylinders are fitted with cast iron trunks of such a diameter as to reduce the area on the top side of the piston sufficiently to compensate for the weight of the blowing piston's rods, cranks, etc. Each trunk is connected directly to the piston-rod, which is of ample strength to contend with the strain caused by having the connecting rod fixed a little to one side of the center line of engine. The position of this rod is no doubt an innovation, but the makers consider that the advantages gained in compactness and fewness of parts more than compensate for any objectionable feature, as the connecting rod has comparatively little to do; and practically it has been found that after three years' operation they are in as good condition as when originally set to work. The slide bars are of V section, so that by setting them up in the ordinary way they take up all lateral play. The blowing cylinders are carried on the top of the standards, and in the arrangement of their valves is embodied the makers' patent.

The valves are shown in detailed drawing on page five of this issue. It will be seen from Figs. 1 and 2 that they consist of circular discs lying upon grids, varying from 6 in. to 8 in. in diameter or more, according to the size of the engine, arranged in an annular chest round each end of each blowing cylinder. One suction valve and one delivery valve are secured on a single central spindle, as in Fig. 3 and 4, and by unscrewing the nut on the top of this spindle the pair can be taken out in a very few moments for examination. The valves rise and fall bodily on the grids, and so are not injured by the constant bending backward and forward to which the ordinary valves of the usual construction are subjected. By the improved arrangement of valves the minimum of clearance at the end of stroke is obtained, and it also allows the castings of cylinder and chest to be made in a very simple form.

The economy in fuel is a desideratum an additional expansion valve is provided in a simple and efficient manner. The position of the air pump and steam cylinder below the floor is very favorable to keeping the steam and exhaust pipes out of the way, and the engine house comparatively cool. The piston valves, etc., are also all easily accessible.

A rolling mill for re-rolling old rails has been projected at Cheyenne, Wyoming Territory.



BLLOWING ENGINES FOR KRUPP'S STEEL WORKS

large gathering on Wednesday last. The trains on the Hudson River and Poughkeepsie and Eastern Railroads came in laden with visitors. A special train from Hartford, containing Mayor H. G. Robinson, the members of the Common Council, and a number of prominent citizens of Hartford, came through from that city over the Poughkeepsie and Eastern Railroad in three hours and 40 minutes, the quickest time made over the line. The invited guests gathered at the Morgan House, where

Robert Sandford, Pelton C. Husted, H. S. Jewett, E. Parker, George Carson, Egbert Smith, James Mabbett. The procession included a detachment of veteran volunteers under the command of Capt. Wm. Platt, 21st Regiment, four fire companies, students at Eastman College, Knights of Pythias, United Order of American Mechanics, St. Peter's T. A. B. Society, German Turners, Independent Order of Odd-Fellows, Poughkeepsie Lodge, No. 296, F. & A. M.; Poughkeepsie Com-

ern Railroad, Connecticut Western Railroad, and the Boston, Hartford and Erie Railroad and connections in the East.

The apparatus designed by the Astronomer Royal to represent the transit of Venus consists of an opening cut in a screen, through which the rays of the sun are thrown by a mirror. Across this opening is a glass slide, on which a black disk, to represent Venus, is drawn by sleek work.

## The Hudson River Suspension Bridge—Laying the Corner-Stone at Poughkeepsie.

The occasion of the laying of the corner-stone of the new bridge that is to span the Hudson River at Poughkeepsie, called forth a

they were received by Mayor Eastman, P. P. Dickinson, secretary of the Bridge Company, and others.

Soon after 12 o'clock the various organizations which were to take part in the celebration formed in Market street. The Grand Marshal was Col. George Parker, whose aids were

mandery, No. 43, Knights Templars, and 60 carriages, occupied by invited guests. The procession passed on to Reynold's Hill, on the summit of which the eastern tower of the bridge is to be erected, and the corner-stone of which was to be laid. After the Grand Chaplain had invoked the divine blessing on the success of

the enterprise, the various working tools were distributed by the Grand Master to the Senior and Junior Wardens. The stone was lowered into place, tested and found to be true. The offerings of wine, corn, and oil were made, and the ceremonies were closed by the singing of an ode. In the back part of the stage was a large colored map showing the route of the proposed new railroad, the bridge, and the railroad connections. The parquet was floored over, and three large tables were set. About 300 persons sat down to dinner.

Mayor Eastman welcomed the guests of the city, and especially thanked those from the Keystone State, who represented the leading railroad interests of the nation, for the aid they had extended to the enterprise. Cyrus Swan read a number of letters of regret, including one from the Hon. Hamilton Fish, and another from Gov. Dix. The first regular toast, "The Bridge," was assigned to A. L. Dennis, president of the Bridge Company; but as he laughingly assured his auditors that he had only agreed to furnish the materials for the bridge, while the Mayor had promised to do all the talking, the latter was obliged to take his place. He sketched the history and prospects of the enterprise, and closed by calling upon Theodore Cuyler, of Philadelphia, to speak in honor of the second toast. "The State of Pennsylvania; her freights of coal and ore." Among the other toasts were, "New England—her manufactures and population," Mayor Culen, of Boston; "the State of New York," Judge H. A. Nelson; "the railway system connecting New England and the West," the Hon. Homer Ramsdell.

The dimensions of the proposed bridge are as follows: Height of railroad track above the water, 100 feet; length of water span, 3420 feet; land approaches, 1080 feet; distance between piers, 500 feet; height of piers from bed of river, 210 feet; total weight of masonry in structure, 2,000,000 tons; total weight of iron, 9000 tons. It is claimed that the bridge will form an important link in the new central trunk line from the coal fields to New England and to New York city, and from the West to the East by the Pennsylvania Railroad, Erie Railway, Midland Railroad and connections in the West, and Poughkeepsie and East-

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**FILE MAKING BY MACHINERY.**

*Synopsis of the History of the Industry in Europe and the United States—Causes of Failure and Conditions of Success.*

It is probably known to most of our readers that very few, if any, kinds of business require so much care as that of making good files, since in every operation they can be spoiled. In the forging care must be taken with each file that it is not overheated. The annealing is also to be carefully and closely watched, else the same result will follow. Grinding, too, is important, as care must be used to get all the scale or oxide off, and, also, that each file be ground true and its surface not burned, and so rendered incapable of being hardened. In the cutting files may be spoiled by miss-cuts, shallow-cuts or dull-cuts. In hardening the same great care must be observed, as here, too, overheating will prove fatal to their wearing qualities. And, finally, if they be perfect at the completion of this process, they may be easily spoiled by careless handling or by allowing them to rub against each other.

These are a few of the difficulties with which all file manufacturers, whether by hand or machinery, must contend to a greater or less extent. What, then, must be the obstacles to be overcome when to these difficulties are added those attending the inventing and perfecting of machinery to perform these various operations, not only on one pattern file, but on the hundreds of patterns required to suit the various wants of the public, and all to be done by comparatively unskilled labor?

A common notion has long existed, and still prevails, that if a person invents a file cutting machine, he is entitled to all the capital he requires to apply it, beside a heavy bonus for his patents, and to immediately commence the manufacture of files by machinery; but if capitalists would but consider how much remains to be done before such enterprises will become, or can be made, self-supporting, they would, at least, hesitate. Some there are, however, who can see a fortune in a patent—a simple piece of parchment, in most cases—but while a few are valuable, the greater portion are worthless.

The common practice by many who have attempted making files by machinery has been to do the difficult portion by skilled hand labor, and substitute machinery in the simpler processes. The objection to this system is that labor, imbued as it always is with the spirit of trades union opposition to machinery, is ever on the watch to charge all blame to the machines, and as the two elements are exactly opposite, one or the other must eventually give way, though in the meantime the reputation of the file must necessarily suffer.

Attempts to cut files by machinery are not new, dating back to the middle of the last century. The vast capital employed in England in the manufacture of files has very naturally led those interested to make various attempts in this direction, and numerous patents for file cutting machines have been taken out, but, until quite a recent period, attempts to work them have been failures. Since 1860 several efforts have been made, notable amongst which was the Birmingham Patent File Works, started at Birmingham with large capital, to work the cutting machinery invented by Etienne Bernot, of France. The company expended considerable sums in buildings and machinery, but in a brief period of less than three years abandoned the enterprise. The same may be said of the attempt made by the Prestons, who invested quite largely in plant and machinery near Manchester. A few years since the British Patent Hardware Co., of Manchester, with an American mechanic at its head, was organized, and introduced machines for grinding saws. They afterward adapted them to grind files, and at first ground the blanks for hand workers; but they soon found so much opposition from the trade unionists that they were obliged to apply machinery for cutting and forging, or give up the attempt altogether. This company is still running, but with what success we are unable to state.

In Sheffield, the center of the file manufacture, little has been accomplished. Early attempts were made by Turtons, and others of the more enterprising masters, to introduce machinery, but without success. The strike of 1866, however, gave renewed determination to some of the masters to again introduce machinery, and since that time a few machines have been in use. But file making by machinery in England, to any considerable extent, must be for a long time seriously impeded, as the file smiths' union is, and has ever been, one of the most obstinate, as well as most powerful, in the kingdom. In 1866, the entire file business was suspended for over six months, during which time over three thousand of these unionists were out of employment, at the command of men possessed of the same spirit and character as the notorious Broadhead, who, with many other unionist leaders, were shown up in their true colors, and by their own confession, before the Parliamentary Trade Union Outrage Commission of 1866. This spirit has ever shown and made itself felt in England, and must continue to be felt, to a greater or less extent, during the present generation.

Those who have attempted the manufacture of files by machinery in this country have realized the advantage gained by having liberal minded mechanics in their employ, men who think and are never surprised at anything. These men become interested in their work and do their very best to aid in securing the best results, and are as gratified as the master himself when satisfactory results are obtained. The ultimate result of all such enterprises by machinery must be materially affected in proportion as these opposing elements enter into them, whether in America or elsewhere. Other countries have also done something in file cutting machinery, the fine and small files made by Raoul and Proutel et Cie, of France, as also

those made by Vautier, Baumer, Grobet, and others, of Switzerland, are said to be made by machinery, and while it is certain that these files have acquired a reputation not exceeded by the celebrated Stubbs, yet as they are for watchmaker's and jeweller's use, they have never materially affected the heavy file business.

In the United States, file manufacturing, except such as may be done by the few English handworkers scattered throughout the country, and who are engaged principally in retouching, must eventually be done in the peculiarly American way to become a success. It is essential that machinery should be substituted for hand labor wherever such application is possible, and so applied as to use comparatively unskilled labor. Upward of 20 years ago a company was organized with a large capital under the name of "The American File Works," with a man of unusual mechanical ability at its head. They erected extensive brick buildings at Ramapo, N. Y., and made the first attempts of importance to manufacture files by machinery in America. Their files were used by some of the largest shops in the country. In a few years, however, the project was entirely abandoned. Some years later an attempt was made in Hartford, Conn., several machines were built and started, but this enterprise was also a failure.

During, or about the year 1858, the Whipple File Company started manufacturing files at Ballard Vale, Mass., with cutting machinery invented by Mr. Milton D. Whipple. Little headway was made, however, until the war broke out, when the rapid advance in gold, combined with the scarcity of English files, enabled the company to find a ready market for its entire production without difficulty. These unnatural prices and the apparent prosperity of the company soon enabled its president, Mr. W. P. Pierce, a gentleman of unusual financial ability but lacking mechanical experience, to enlarge the works from time to time, to keep pace with the growing demand. No disastrous effect was experienced until gold began to decline, when the difference between the price of English and American files, which had hitherto been growing larger, began to diminish. Then it was that the struggle began in earnest, and Mr. Pierce's real talent was required to be exerted to its utmost. Among the difficulties encountered by this enterprise, was the one, either real or imaginary, that the steel manufacturers of the old country could not, or did not, make steel good enough for Whipple files. Steel works were, therefore, erected, and larger quantities of files made, that they might be made more cheaply. In the meantime, gold continued to decline, and competition would and did continue in spite of Mr. Pierce's best calculations. It was also found that the rapid increase in production was not all gain, as the "Pembertons" or second quality, hitherto ruinously large, and difficult to dispose of, were in a larger proportion than hitherto to the total output. The increased production, however, was still kept up, until the fall of 1869, when no more capital was to be had. The company stopped, and its property was sold at public auction. The capital stock of this enterprise at the time of its failure amounted to some \$700,000. Its liabilities were very heavy, and the effect of its failure was felt severely by its stockholders, the property being sold at ruinously low prices.

During this period other companies of considerable magnitude were started, the first of which was the American File Company, which obtained a charter during the spring of 1868. Mr. James S. Brown, a gentleman of abundant means, and a successful manufacturer of cotton machinery, took stock in the enterprise and became its manager. The cutting machinery used by this company was the Bernot, the same as started by the Birmingham Patent File Company, previously referred to. Substantial brick buildings were erected at Pawtucket, R. I., machinery built, and everything looked favorable for success. In the fall of 1864 Mr. Brown, its manager, from some cause sold out his interest and withdrew from the enterprise. The company continued until the fall of 1867, when the outlook being anything but encouraging, the works were stopped, machinery stored, and the buildings sold to be adapted to the more lucrative business of manufacturing cotton cloths. The company continued employing a few hand workmen only, and, doing comparatively little for nearly two years thereafter, when they erected cheaper wooden buildings, and again started their machinery. Numerous changes have been made in their management since they started, but a portion of their machinery is still running.

The Weed File company began operations in South Boston in the spring of 1866, with large capital. They erected extensive buildings, and displayed much energy in getting their goods into the market in an exceedingly short time thereafter. In April, 1868, however, their machinery was sold at public auction. This company made little attempt to use machinery except for cutting; the forging and grinding being done by English workmen principally, and in the peculiarly English manner.

The Nicholson File Company, of Providence, R. I., was organized in the spring of 1865, with Mr. W. T. Nicholson, the inventor of their machinery, at its head. Their substantial, brick buildings were planned to admit of enlargement from time to time as might be required. One of the first steps taken was to ascertain what had been done, not only in America but in the old country, both in files and steel, and to this end their agent spent several months in Europe, with full instructions to purchase such machinery as might be thought worthy of adoption. After nearly nine years of the closest attention by Mr. Nicholson, it is gratifying to be able to say that this company is a success, not only in a pecuniary sense, to its stockholders, but in producing first-class files, as many of our readers are undoubtedly aware. Not only do

we see the large and simple kinds, but even the smallest sizes, handled by machinery with a care and precision not exceeded by the most skilled hand workers, while throughout the entire works a most complete system of inspection is maintained. The works have grown slowly, it is true, but surely, now having machinery to produce upward of seven hundred files per day when in full operation. The demand for their files of late has been such that the company have not been obliged to employ travelers, which, in itself, is good evidence that these files are appreciated by the public.

In the fall of 1869, Mr. Fessenden, the former superintendent of the Whipple File Company, in company with Mr. David Blake, established what are known as the Western File Works, at Beaver Falls, Pa., having purchased the Weed and a considerable portion of the old Whipple machinery, as also some few machines, such as are in use by the Patent Hardware Company, of Manchester, Eng., started under the superintendence of Mr. Fessenden. Large buildings were erected, and a degree of activity displayed during the short time they have been running, which is worthy of success.

From the foregoing may be gathered the principal facts regarding what has been done, as also what is now doing in this important branch of manufacture. It may also convey an idea of the obstacles which must be overcome in the successful manufacture of files by machinery. In most of these attempts it would seem that the managers had entirely failed to realize the peculiarity of the position of the teeth, and the manner in which the files were to be used. The principal idea which has been developed, not only in the earlier but also in the more modern inventions made for cutting files, has been to make a machine that would alternately move the blank to be cut equal spaces during its entire length, and to provide a hammer either holding a chisel and striking a blow, or striking a chisel held by some special device, at each alternate movement of the blank. This regularity of movement, while it would produce a file with teeth as perfect as could be made by hand, has always been the chief objection to the machine file, causing the many complaints heard about "running in grooves," "chattering," &c. The regularity of the teeth so characteristic of most machine work, is not easily obtained by the hand worker, who, seated with his blank firmly held to a stone block in front of him, strikes the chisel into the blank and raises or produces the first tooth; the chisel is then lifted out of its groove, placed on the blank and slid up until it comes into contact with the tooth previously raised, when the second blow is struck and another tooth is produced, and so on. Now, if the force of these blows were alike in each case, then the spaces would be equal, but as it is utterly impossible for the most expert workman to strike the great number of blows required in the entire side of a file with exact uniformity, it will be seen that irregularity in the teeth must exist. Undoubtedly, the failure of the Whipple and Weed, as well as many of the earlier enterprises, may be traced, at least in a great measure, to the fatal defect in their machinery, of producing this extreme regularity in the files. This brings us to consider, in conclusion, the only real invention worthy of note in the file itself, which has been produced during this entire period. We refer to an invention, patented by Mr. W. T. Nicholson, of the Nicholson File Company. Mr. Nicholson saw this defect in other machine-made files, and so arranged his machinery that he could produce a file with teeth, in their spaces, conforming to the hand cut file. The article produced, the company saw fit to call it the "increment cut file," the word "increment" meaning increase. These files are not cut with a uniform depth or space, and no two spaces can be found exactly alike in the entire length of the side. The difference between this and the perfect regularity of other makes must be apparent, particularly in double cut files, as, in the one case the file cut with such extreme regularity, when put to use, will in the first inch of its movement produce channels or grooves, and these grooves will continue to be made deeper as the file is shoved along, thus producing that "grooving" and "chattering" so often complained of, while in the "increment cut file" the grooves made by the movement of the file for the first inch, will have their sides cut away as the file is moved toward the "tang" or handle, and vice versa, and while it is cutting as fast as its points permit, it is also said to cut smoother than the best hand cut of the same coarseness. The irregularity spoken of consists not only in the spaces between each tooth, but also in the heights of the teeth themselves, thereby completely removing the objections hitherto urged against machine files. The established and still increasing reputation of these files is sufficient evidence that this improvement is thoroughly appreciated.

In writing this article we have had no desire to reflect upon past or existing enterprises, but simply to give a brief recapitulation of what has been done in this and the old country, and also what is doing at the present time, to manufacture by machinery files which will compare favorably with those made by hand; and while we may not have reached the highest possible perfection in the adaptation of machinery to this delicate and difficult work, it will be seen that we have already made substantial progress in this direction.

The imports of iron into Belgium in the first eight months of this year were 125,000 tons, against 100,000 tons in the corresponding period of 1872. The imports have largely increased this year from England. On the other hand, the exports of iron from Belgium declined from 180,000 tons in the first eight months of 1872 to 162,000 tons in the first eight months of this year. The exports of Belgian iron to England and the Low Countries have especially fallen off this year.

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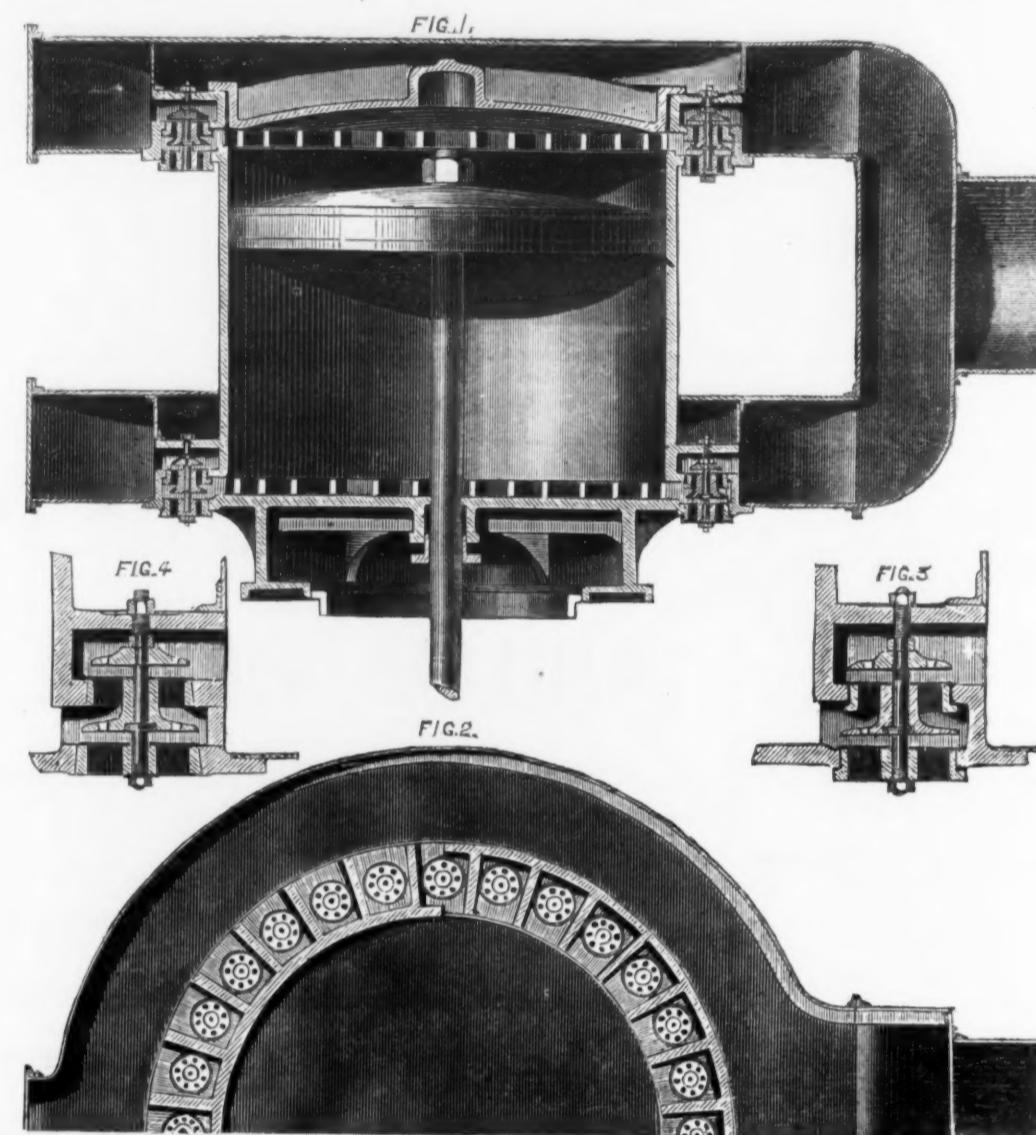
## Scientific and Technical Notes.

A writer in the *Car Builder*, describing the difference between

ANCIENT AND MODERN BRIDGES, says: The knowledge of the arch as a method of construction with stone or brick—both of them materials aptly fitted for resistance under pressure, but of comparatively no tensile strength—enabled the Romans to surpass all nations that had preceded them in the course of history in building bridges. The bridge across the Danube, erected by Apollodorus, the architect of Trajan's Column, was the largest bridge built by the Romans. It was more than three hundred feet in height, composed of twenty-one arches resting upon twenty piers, and was about eight hundred feet in length. It was, after a few years, destroyed by the Emperor Adrian, lest it should afford a means of passage to the barbarians, and its ruins are still to be seen in Lower Hungary. With the advent of railroads, bridge-building became

usual time another went to seek him, found him senseless, and he himself fainted crying for help, two others then entered, and having drawn their comrade near to the entrance fell down suffocated, the two remaining men saved the one nearest the entrance, and then losing all presence of mind, rushed about calling for help, and a founder named Norris, regardless of all danger, got out the other three men, one of whom was at the distance of eighteen, and another of twenty-five meters from the entrance; these two unfortunate men were dead. Norris has since received a gold medal for his intrepidity. The engineers could not discover exactly either the nature or source of the noxious gases which had invaded the conduit after it had been completely cooled; they think that the first of the men must have disturbed a quantity of carbureted hydrogen and carbonic oxide previously imprisoned by the tar. The second accident, very similar to the first, occurred in a conduit one meter in diameter, which conducted the hot gases of the blast fur-

method of voltaic cells, so that the secondary battery of lead plates may be charged by it. It is not necessary that the secondary couple should be kept in continuous contact with the primary exciting battery, for the former having been once charged is capable of a series of consecutive ignitions. With a secondary couple of large dimensions, having an active surface of one and a half square metres of surface, from 3000 to 4000 consecutive ignitions have been obtained. A very large number of successive ignitions may also be obtained by regulating the discharges by intervals, in consequence of the property which the leaden electrodes possess of preserving for a long time a portion of their charge. M. Plante proposes to designate his apparatus "Briquet de Sature" (Matches of Saturn). He states that a taper is lighted by a platinum wire heated thus to a red or white heat much quicker than by any other method. The incandescence of the wire has no effect of irritating the atmosphere; there is no smoke, smell or gas given



DETAILS OF BLOWING ENGINES FOR KRUPP'S STEEL WORKS. (For Description, see page 1).

even a greater necessity than it had ever been before, and the use of iron has enabled engineers to grapple with and overcome difficulties which only fifty years ago would have been considered hopelessly insurmountable. In this modern use of iron, advantage is taken of its great tensile strength, and many iron bridges, over which enormous trains of heavily loaded cars pass hourly, look as though they were spun from gossamer threads, and yet are stronger than any structure of wood or stone would be. The chief bridges of ancient times were built as great public conveniences upon through-ways over which there was a large amount of travel, and consequently were near the cities or commercial centers which attracted such travel, and were therefore placed where they were seen by great numbers. Now, however, the connection between the chief commercial centers is made by the railroads, and these penetrate immense distances, through comparatively unsettled districts, through towns and villages, and that being placed in alternation with the lower openings, they would give rise to currents of air which would rapidly carry off the deleterious substances that tend to disengage themselves from the deposited liquids or powders. He also suggested that experiments should be tried to clear the conduits by means of jets of air or steam obtained by means of the blowing engines or steam boilers at the works.

M. Plante has lately brought to the notice of the French Academy a curious application of secondary couplers, which he styles the

### BRIQUET DE SATURNE.

The device consists of large plates of lead immersed in dilute sulphuric acid, which become electrically charged by prolonged action of any of the ordinary forms of the voltaic battery. By such means the electro-motive force of a comparatively small battery is enabled to produce some very remarkable effects. The apparatus employed by M. Plante consists of a small secondary couple, contained in an arrangement whose bottom and sides have the necessary system of communication so disposed as to inflame a platinum wire, and to ignite by the simple pressure of the finger, or by a metallic key, a combustible body such as a taper, a spirit lamp, gas, &c., placed near it. The voltaic battery used to set the apparatus in action is of an extremely simple character, consisting of three elements, having respectively a plate of zinc charged with water, and a plate of copper charged with a solution of sulphate of copper, arranged in the ordinary

off, and no danger of fire. The actual cost is very slight, being limited to the first outlay of the secondary couple, namely, that of the lead and the liquid, and the feeble current of the primary battery is equally of little expense, only requiring occasional renewal of the copper solution. The arrangement is susceptible of numerous other applications.

### Iron and Steel Imports of France.

The official returns of the admission of iron and steel into France, to be worked up and re-exported under the special decree for that purpose, for the first nine months of the current year, supply us with the following figures:

	1873.	1872.
Tons.	Tons.	Tons.
Cast iron.....	53,716	50,419
Wrought Iron.....	13,315	12,341
Sheet.....	4,862	8,163
Ste. l.....	616	...

showing a large increase in each item.

The accompanying returns of the iron, steel, machinery and other articles imported under the decree respecting shipbuilding, is interesting, though it does not supply the figures for 1872:

CHIEF IMPORTS IN NINE MONTHS OF 1873.		
Tons.	Tons.	Tons.
Iron.....	54	79
Pig iron.....	7,91	8,71
Sheet iron.....	7,2	7,2
Ste. l-in bars.....	17	17
Steel in sheets.....	51	51
Copper.....	1	1
Brass.....	80	9
Steam engines.....	6	2
Steam & water machines.....	21	21
Detached parts of machines.....	12	12
Iron tubes.....	8	8
Other wrought iron goods.....	46	46
Anchors.....	70	70
Iron cables and chains.....		

We have omitted all the items of which the totals were less than one ton.

A traveler in North Carolina gives a description of a furnace built at Buckhorn during the war. This furnace, he says, was a model of its kind, being constructed at a cost of less than \$5000 in gold, and making from four to five tons of iron per day. It was stoned to just above the hearth, thence up was merely a framework of timber, with a lining of brick, the space between being filled with packed clay. When burned by Gen. Sherman, it stood as one solid brick. It was a success in every respect, and turned out about 300 tons of pig-iron in sixty running days, but it was managed and run by a practical Scotchman named John Colville.

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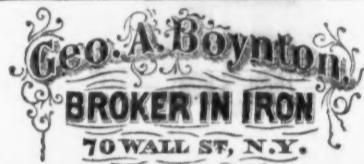
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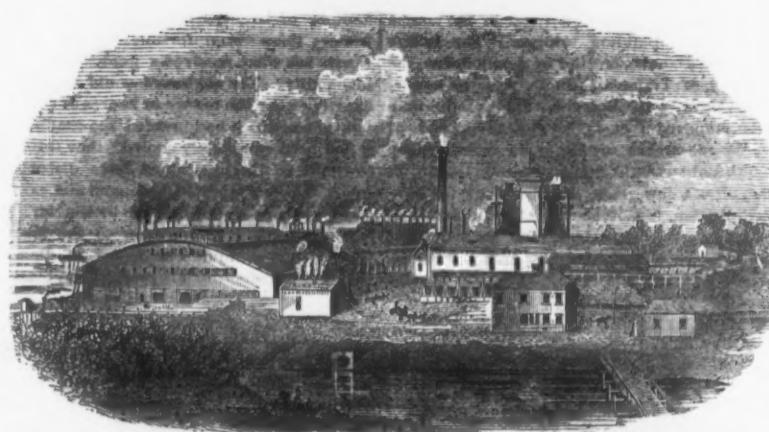
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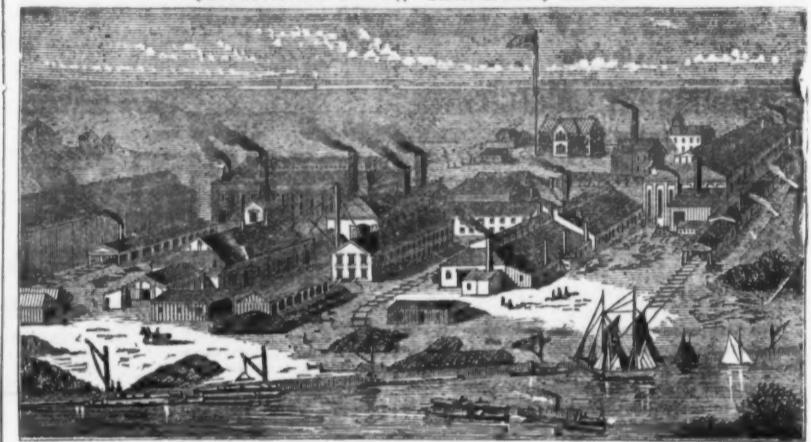
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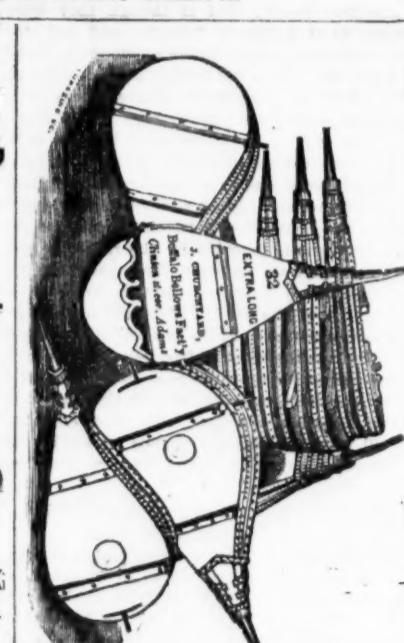
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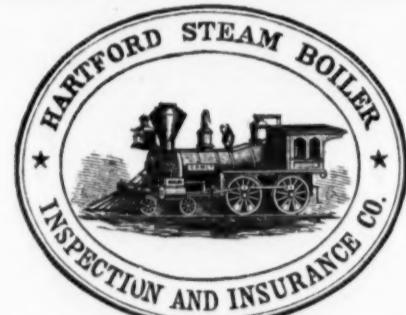
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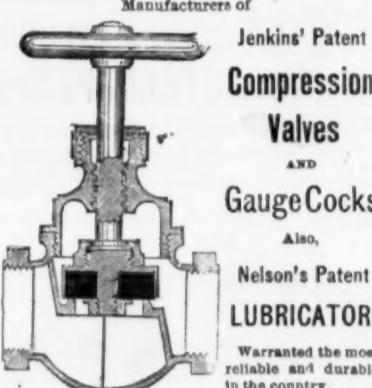
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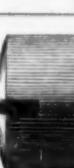
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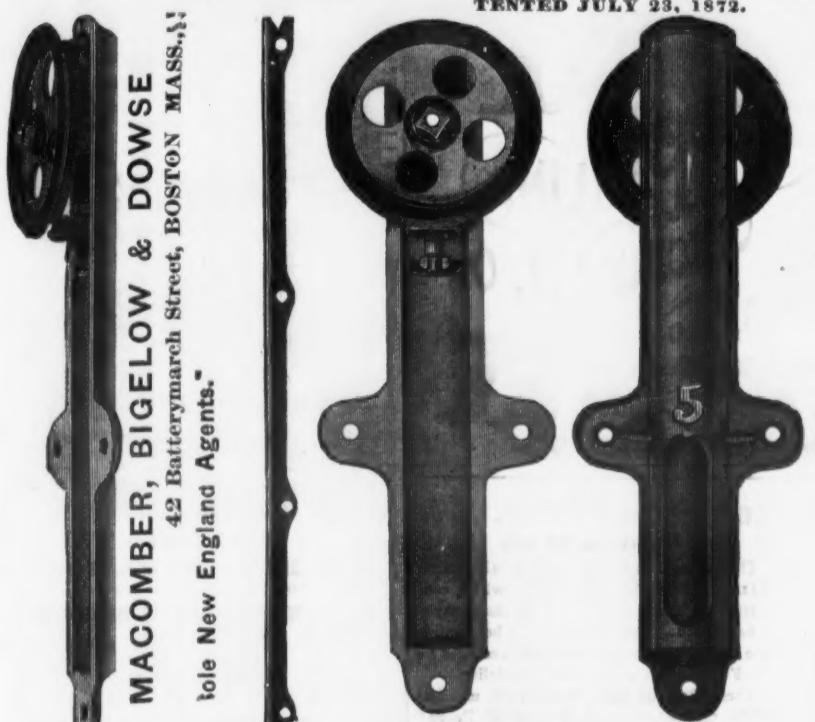
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Track for 4, 5 & 6 in. 1  
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Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails  
Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks,  
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Something New for  
OTIS FURNACES & MINES.  
New Union Steam Safety Elevator,  
How One Works.

RIVERDALE IRON WORKS, DEWEY, VANCE & CO.,  
Wheeling, W. Va., January 14th, 1873.

Dear Sirs: The experience of a year proves that your *Furnace Elevator* is superior to all others in use. We have in the six weeks from December 1st to Sunday last, 12th inst., made 2734 tons, 1401 lbs. Pig Metal, or an average of near 65 tons per day, which required the elevator to lift 73 feet high. 45 tons Iron, Coke and Limestone for each ton of metal produced, or more than 12,500 tons material in the 6 weeks. The largest yield in one day was 82 1-4 tons Iron, involving 14,500 lbs of 35 tons material in 24 hours. This has all been done to our satisfaction, and not, too, in the cold weather, when we have had other furnaces with worse and more unsatisfactory material, too, in the extreme difficulty, on account of the greater freezing in the tanks, and in the case of the air holes, we understand that two furnaces, not far from us, had to "blow out," from being unable to hoist stock during the "cold snap." The difficulty, we are told, was caused by the condensed moisture in the blast freezing to the sides of the cylinders, so that the piston could not move up or down. Very truly yours,

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348 Broadway, NEW YORK.

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Manufactured by the

Stanley Rule & Level Co.,  
NEW BRITAIN, CONN.

Sold by all Hardware Dealers.

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## PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, Dec. 22, 1873.

Comparatively quiet in wholesale trade, the week past has been a blessing to the retailers, as the approach of the holidays gives a general excuse for spending money otherwise hoarded. Whether it be that there is really more money in circulation than usual at this season, or that having it in hand people are tempted to spend more freely, there certainly never was gayer sights among our retail shops than at present, or more people busily engaged in exchanging their currency for useful or ornamental articles.

The character of the importations advances in elegance each year, and the goods offered for the present year, while not more expensive, are certainly far more choice in appearance than at any previous holiday season. Confining ourselves to metallic productions, as in duty bound, it is noteworthy that a very large amount of the bronze ornamental goods sold as imported are made in this country and in this city, rivaling in elegance the finest foreign work.

These are not confined to what is known as "spelter bronze," but ornaments, statuettes and figures of the real article, tinted and colored with the genuine foreign *patine*, which has hitherto been the obstacle to overcome in the manufacture of such goods. Considering the advances made by our works in the manufacture of gas fixtures, statuary bronzes, etc., this is not surprising, but it is an evidence of an improving and more highly cultured taste that such a trade should be supported and encouraged here. The benefits are, however, at once apparent. Ornamental bronzes, which last year could not be had under \$35 to \$50, now are offered in equal elegance, for from \$10 to \$15, thus enabling those of moderate means to possess articles of extreme elegance at a low figure. Another branch of our home industry, peculiarly American, but which has hitherto made little pretension to elegance, that of clocks, has made wonderful strides lately. Few of those who purchase the marble or bronze "Fine French Clocks," with silvery chime striking the quarter or half hour as well as the hour, and equal in accuracy of time to a regulator, know that they come from the busy manufacturing State of Connecticut. Such is the fact, and there are offered this year mantle and other clocks from Connecticut works, which, for beauty in casing and elegance of design, are not outdone by anything exhibited from abroad. Thus, while we note the increase of the great iron works and factories in our land, other industries, which add in a different but no less important manner to our wealth, comfort and enjoyment, are quietly springing up in our midst, although they may at first have, as many similar branches have been forced, to sell their goods as *foreign* to ensure a market.

White is the time to get a ground floor position in the copper companies. Or, for the article is a little misty on this point, perhaps this is an American invention, and if so should be noted as another evidence of American enterprise.

At all events, I give it as it appears, simply adding the Italian apothegm "*si non vero, è ben troppo.*"

A COPPER CLAD SHIP FOR CARRYING COMBUSTIBLE FREIGHT.

The importation of corrosive sublimate, vitriol and similar dangerous compounds has heretofore been carried on to a small extent, says the Jersey City *Journal*, owing to the damages ensuing to the ships used in their transportation, as the leakage and draining from the different named substances, when mixed in the bilge water of the vessels, has in most instances eaten the bottoms out of the vessels.

A company in England running to the East Indies first thought of using copper in the construction of their vessels as a preventive against the bugs that infest that locality, the said bugs being considered death to all wooden vessels, and instances have been known of the successful depredations of the insects even on iron-clad ships.

To obviate these drawbacks to commerce a ship was built completely encased in copper.

The frame work is of iron, which, however, is not exposed in the least. The outside is covered with sheets of thick copper, riveted in the same manner as the iron vessels. The whole interior of the ship is also made of copper, in fact, every exposed part being completely protected by copper, the masts are of wood, but sheathed in copper from top to stem. The name of this copper monster is the *Adirondack*; she is a screw steamer, and is capable of carrying 7000 tons custom house measurement, and is about 515 feet in length, being some seventy feet longer than any of the Oceanic Company's ships.

While all this is pleasant to note, it is equally so to add that every day brings an increase of activity in general manufacturing. As a rule, the furnaces lately out of blast all over the country are either actually "blowing in," or preparing to do so. Many of the mills which intended to let the Christmas holiday continue indefinitely, or until spring, will not shut down over the week, and that will be occupied in repairs. The railroad companies have run old stock over shaky roads just as long as is possible, and 1874 will compel them to place orders for rails and rolling stock. Orders are to-day offering which, were prices satisfactory, could be placed to an amount sufficient to keep the works of Pennsylvania busy at least until May, and a similar state of things is reported West.

Some of our financial prophets draw the horoscope of the trade future as follows: "Money is easy because of lack of confidence to use it in business. Manufacturing is at a discount; by May, all the trades dependent on the railways will be absolutely idle; all the furnaces and rolling mills will be cold (!). The immense amount of capital invested in this business, released in common with that of other trades, will so force itself upon the market for employment as to compel a return of confidence in our ability and wealth, and business will then, but not before, revive." The man who writes that must have his eyes shut, or a very false idea of the enterprise of our people. If every firm in the country had bankrupted in September, there would have been a lively trade in the effects of the deficit before Christmas. The gossip of the week is dull.

The Messrs. Cramp & Sons launched during the week the iron steam collier *Reading*, the first of six similar vessels for the Reading Railroad Co., for which this firm have the contract, but which form a portion of the fleet of one hundred which the company projects. There are already six of these iron vessels carrying coal to New York and New England ports.

The six building at Cramp's will be the *Hamburg*, *Columbia*, *Lancaster*, *Pottsville* and *Phoenixville*, each of 1500 tons capacity, as is the *Reading*, just launched. At Roach's yard, at Chester, the *Perkiomen* and the *Berks*, of 1300 tons capacity each, are being built. In the spring the company's yard at Port Richmond will be finished, and their fleet will be rapidly increased. Most of these colliers in use have hitherto brought water ballast alone on return trips, but arrangements are being made to carry in the future a much more valuable freight, and one likely to have a considerable influence on the iron trade of Pennsylvania.

The question at issue between your Sheffield correspondent and Mr. Wilson for Rodgers & Sons, touching hand forged and "flying" razors, is outside of this bailiwick. The hand forged razor may be the best, just as the iron which commands the highest price in the United States—Ulster—is made, so far as welding the puddle ball is concerned, under a hammer; the manager refusing to allow a squeezer in his mill. But, as to the question of inferiority of American razors, or the consequent superiority of Sheffield goods, I can submit to Mr. Wilson, or any committee of Sheffield cutlery men, a specimen of American razor made in this city, within thirty days, of purely American steel, made from American iron, which I venture to state they will pronounce of superior quality to any ever made in Sheffield, and that is saying a good deal. The "proof of the pudding," etc., we all know, and one of these razors has been steadily used in the barber shop of a hotel for three weeks, without having been ever put on a bone, and with complete satisfaction to the shavers. Moreover, a tool made from this same steel turned off the entire face of a Krupp's steel tyre without being once sharp-

ened. This is not intended for a notice of anybody's steel, but simply to show our Sheffield brother that "all the worth in human nature is not concentrated on his side of the Atlantic," or the skill in steel manufacture, either! Samples of razors and other tools, as well as of the steel from which they were made, with satisfactory evidence of the production of both here in Philadelphia, are subject to the order of the publisher of *The Iron Age* at any time from date hereof. Sporting men have a phrase which runs vulgarly, "Put up or shut up," and Philadelphia here throws down the glove to Sheffield.

A matter of some interest to the members of the Franklin Institute was the report of the committee on opening the hall of Sundays, at the last monthly meeting. The committee reported in favor of submitting the whole matter to a vote of the members to be taken on the day of the annual election, which occurs on the third Wednesday in January. There can be but one answer to the question it would seem. The experiment has been fully tried here and elsewhere in the opening of free libraries on Sunday, and everywhere with the best results. The average workingman would at least be much better engaged in the reading room of the Franklin Institute on Sunday than, as he is, in holding communistic meetings at the Assembly Buildings and resolving, "that the city lease all mills and other industrial establishments that are idle, and the same would furnish employment to thousands." Here is a *ring* chance, which even the palmiest days of your hapless Tweed did not offer. Fortunately we have just adopted a new constitution which upsets all rings and their sealings, and our international friends had better visit the Franklin Institute and study improved mechanics, by far.

We have just got to congratulating ourselves upon being able to build iron ships in competition with Great Britain, when, lo! they are to quite upset us by substituting *copper* as the material for shipbuilding. Take the following from a local paper and submit it *verbatim*. I should certainly be headed "Important if True," for if we are to use copper for ships, now is the time to get a ground floor position in the copper companies. Or, for the article is a little misty on this point, perhaps this is an American invention, and if so should be noted as another evidence of American enterprise. At all events, I give it as it appears, simply adding the Italian apothegm "*si non vero, è ben troppo.*"

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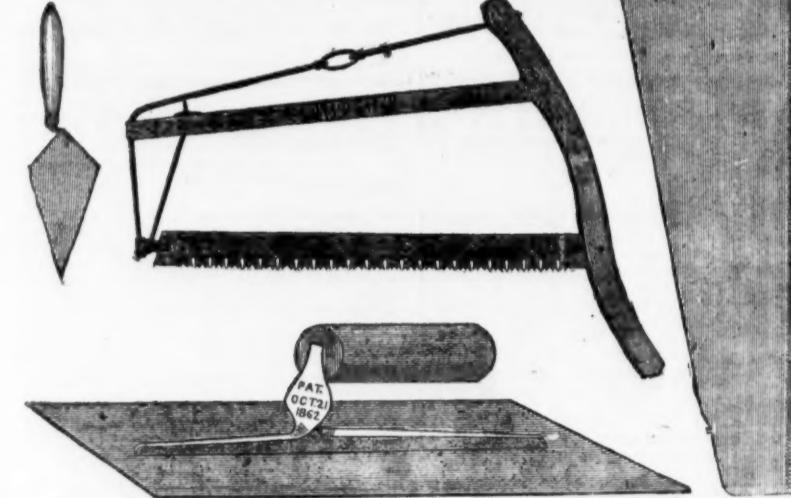
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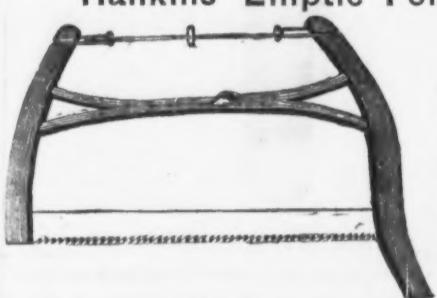
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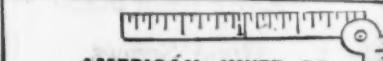
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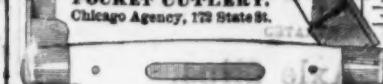
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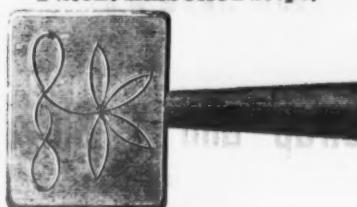
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Upper View.

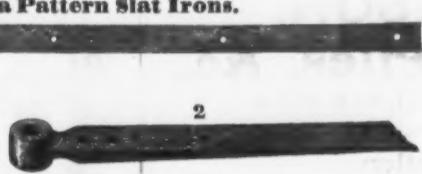


Lower View.

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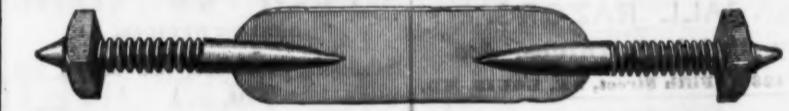
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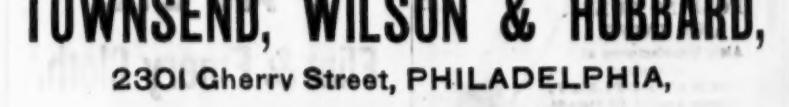


Cone Head Bolt.

Cone Head Bolt.

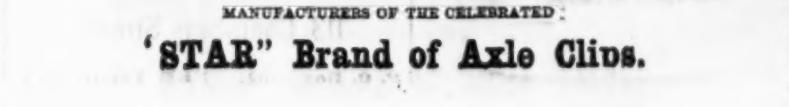
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Perch Bolt.

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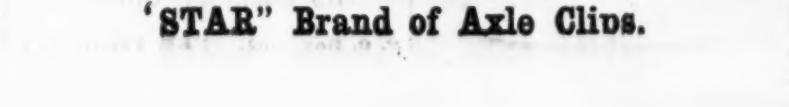
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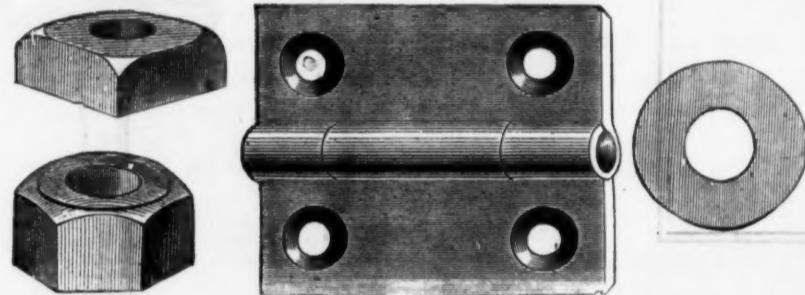
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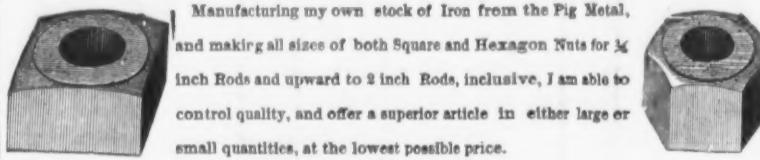
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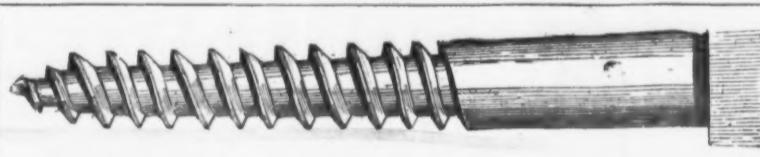
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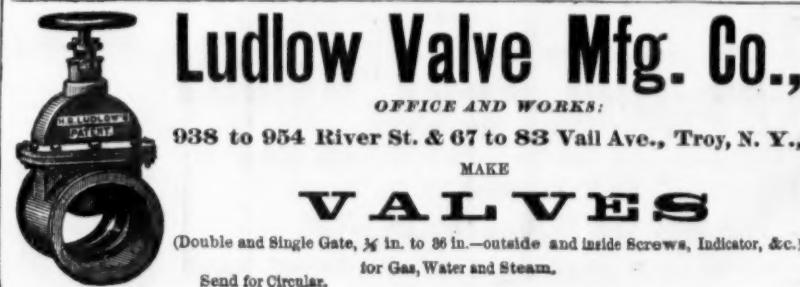
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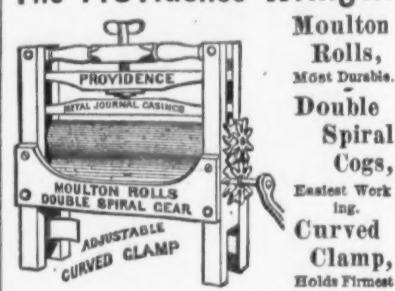
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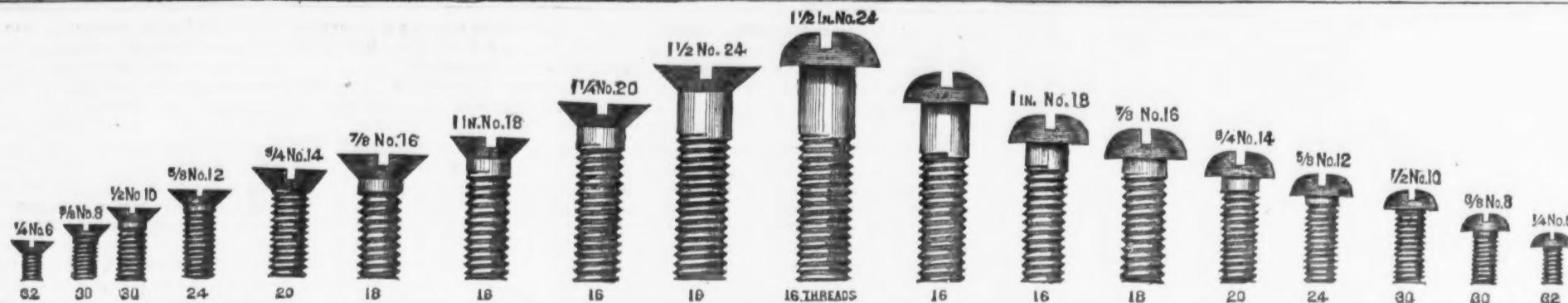
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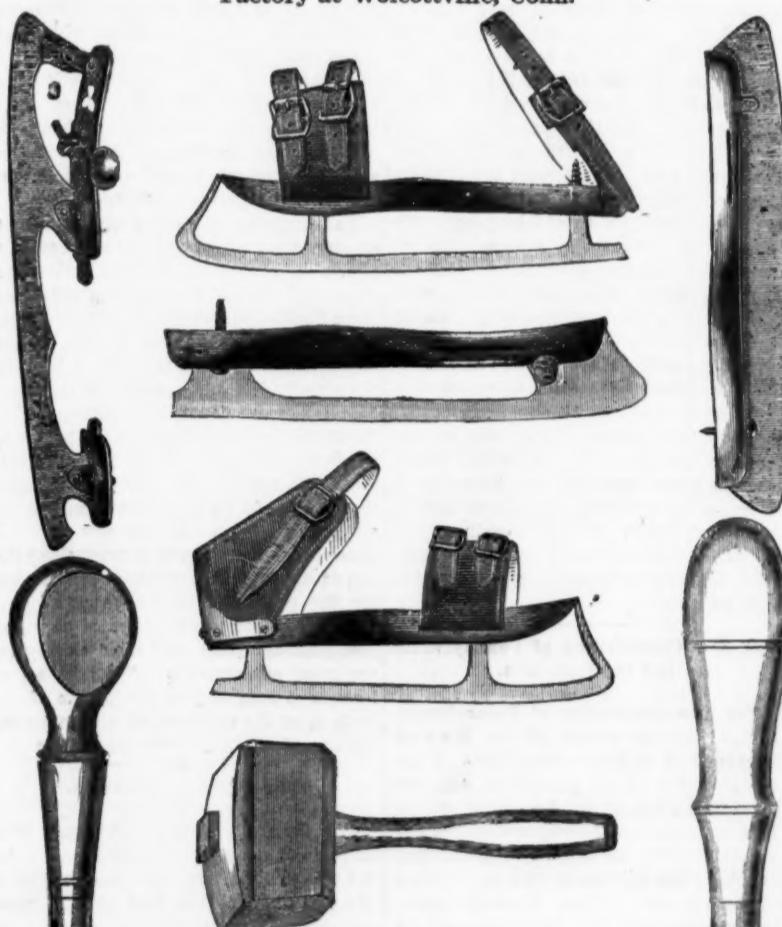
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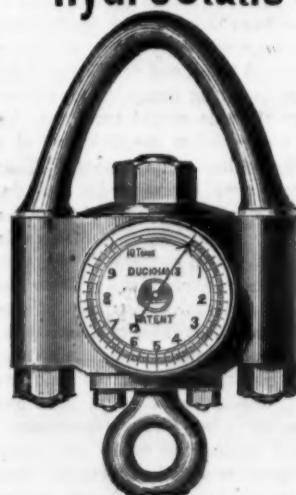
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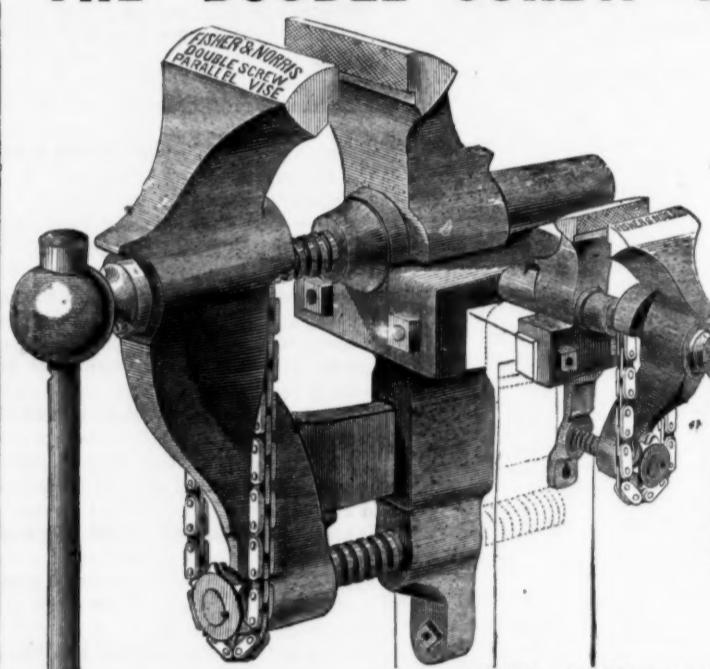
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New York, Thursday, December 25, 1873.

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JAMES C. BAYLES . . . . . Editor.  
JOHN S. KING . . . . . Business Manager.

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The Lessons of a Year.

The events of the year now drawing to a close, especially those which will make it memorable in our commercial history, have taught us many practical lessons which it would be well for us to remember. The system of philosophy which teaches that our misfortunes are blessings, in that they show us how we may avoid worse evils and misfortunes in the future, may not find universal acceptance, but it is based upon a truth which admits of universal application; and if our national misfortunes during the past year do not result in permanent national benefit, it will be because we shall refuse to heed the lessons of prudence and foresight which they should convey to every thoughtful mind.

Among these lessons the most obvious is that which points out the danger of trusting to the promise of an uncertain future, as seen from the standpoint of a prosperity resulting from unduly stimulated and speculative commercial activity. The panic came upon us without warning or premonition. A few far-sighted persons may have apprehended a sudden collapse of the bubble of railroad speculation, but it was, at most, only a vague apprehension, and none knew when it would come, nor how disastrous would be its effects.

When the crash came which shook our financial and commercial systems to the foundation, we were unprepared for it, but, fortunately, in a position to bear up against it. We had learned from experience the danger of long credits and extensive commercial operations upon small capital, and our merchants and tradesmen were doing business upon so safe and solid a basis that the danger of a credit panic was averted. Had we also learned from past experience the folly of building railroads upon call loans, of expanding our railroad system beyond the requirements of commerce, and of attempting to force, by artificial means, a national development more rapid than our increase in population

and wealth would permit, we should have escaped the misfortunes which have befallen us, our workshops and factories would not have been closed, our working people would not have wanted employment, and our commerce would not have suffered partial paralysis. It would be profitless, even at this time, to recount these facts, were it not that the causes which brought about the panic are mistakes to be guarded against in future, and if the lesson learned from experience is remembered, we shall in future enjoy a more substantial and regularly developed material prosperity, even though our progress in certain conspicuous directions be less rapid. Capital has been taught the danger of seeking investment upon the specious representations of interested speculators, and of discounting too cheaply the promise of an uncertain future; and unless the spirit of reckless speculation shall again take possession of the people, this lesson, at least, is likely to be remembered.

A second important lesson of the year is the warning it carries of the danger of considering our industries beyond the reach of foreign competition, because, from various causes, they may chance to enjoy a more than average prosperity. During the first half of the year the opponents of the tariff found in the admitted prosperity of certain industries, especially in iron manufacture, a pretext for raising the cry of "favored monopolies," and for demanding that these industries, then competing upon more than equal terms with those of foreign nations, be cut off from all the benefits of security they had enjoyed under protection. Even among iron makers' there was some disposition to regard the benefit of the tariff, so far as they were concerned, as a thing of the past, and to both feel and express indifference to the future action of Congress upon this all important subject: while at this very time foreign manufacturers were sending to this country, under the comparatively low duty imposed by Congress, large shipments of iron, much of which was sold at a loss, and much left unsold, to be sacrificed, as soon as any demand exists, at prices with which our own makers' cannot compete. Let us not be understood as expressing views different from those expressed by us early in the year. We have lost none of the confidence we then expressed in the future of American iron, nor do we doubt the entire wisdom of the most liberal investments in iron manufacture, if made judiciously and with reference to future, as well as present, advantage. We believe, moreover, that this country will be the future seat of the great iron industries of the world, for reasons so obvious that even our British competitors are compelled to admit that the world's supply of iron, ores and coals must be sought on this side of the Atlantic at no distant day. We believe that England has reached the limit of her greatest possible industrial expansion, that she has lost, or is losing, the ability to maintain her export trade to this and other manufacturing countries, and that we are steadily gaining strength as a competitor for her export trade in iron: but as we have said all along, we must not consider her broken and powerless rival until we shall have captured her trade, or we shall furnish her with a new industrial vitality born of strength we ourselves shall lose. In our progress toward a great industrial development, we must expect to pass through many seasons of dullness and depression, perhaps of disaster. It will not be all smooth sailing, and one of the most important lessons to be drawn from our experiences in 1873 is, that we are not yet ready to sacrifice any part of the system of protection to home industry, to satisfy the clamor of those who would have the extent to which we export gold to pay for foreign commodities the measure of our national prosperity. The time will come when we shall not need a tariff for protection, but that time has not yet come, and 1873 has given proof that it is yet a long way off.

There is but one other lesson of the dying year to which we have space to call attention at this time, and of this we must speak briefly. It is the inutility of trade unions, and the folly of all attempts on the part of labor to control capital. We are no advocates of cheap labor. High wages have contributed materially to the growth of the country by attracting to our shores the skilled and unskilled labor of Europe, and without that inducement immigration would fall off rapidly. But under ordinary conditions of industrial and commercial activity, wages must remain relatively higher in this country than in Europe, for the reason that the demand for labor must exceed the supply for generations to come. Nor are we opposed to industrial organizations on general principles. They are capable of accomplishing much good, and should be encouraged by capital in any beneficial and praiseworthy under-

taking; but when the trade unions imbibe the spirit of communism, when they give eager audience to demagogues who preach the so-called socialistic errors which the history of centuries has disproved; when they "make war upon capital," and by strikes and violent measures seek to coerce it into submission to the ignorant will of labor, such unions become public nuisances, if nothing more. During seasons of great industrial activity they gain a seeming power. Capital yields to all reasonable demands, and sometimes to demands that are unreasonable, and the demagogues flatter their deluded followers into the belief that the power of capital is broken, and the day of triumph for labor is at hand. But with the first menace of real danger to the interests of capital is the scene changes. Concessions are withdrawn; workshops and factories are closed until their owners shall please to open them; wages decline to employers' terms; men who, a few weeks before, threatened strikes and talked loudly of the power of the unions, beg for employment upon any terms rather than stand idle and starve, and the demagogues are silent. Such a change we have witnessed during the year now drawing to a close. What is the lesson of that experience? It is that labor cannot control capital, and that in employing strikes and threats as a means to that end, the trade unions only furnish the world an illustration of "the engineer hoist with his own petard." But another and most important truth has been taught by the events of the past three months, and that is that capital has at heart only the best interests of labor. In hundreds of cases workshops and factories have been kept running on part time, for the sake of the workmen and their families, when their owners would have saved money by closing them; in many instances which have come to our knowledge money to pay wages has been borrowed at ruinously usurious rates that the men might have something to live upon; and in nearly every instance of which we have any knowledge, employers have considered the best interests of their operatives, and have made every sacrifice of self-interest which could redound to the advantage of those dependent upon them. Will the workingmen profit by this experience, or will they forget the lesson they have learned, and re-enact, with the return of prosperity in 1874, the follies and crimes of which the trade unions have been guilty during the past few years?

Congress.

It is, perhaps, scarcely worth while to waste valuable space in complaining of the short-comings of Congress. Experience has shown that the average member of that body cares about as much for public opinion, outside of his own district, as a graven image cares for the opinion of an art critic who may chance to hold it in low esteem; and if he can "make things right" with his constituents by doing good party work and occasionally introducing a bill to further some "job" in which the electors of his State take an interest, he feels that he has done his whole duty as a member of the National Legislature. That he is in any way accountable for the utter neglect of measures designed to promote the general welfare; that he is responsible, so far as his influence goes, for the sins of omission, as well as of commission, with which Congress is justly chargeable—in a word, that he has anything to do beyond serving his party and making his own re-election to office sure— are ideas so large as to be practically beyond his intellectual grasp. The country might be tottering on the verge of war—he would postpone action until the possibilities of irrelevant discussion were exhausted: the national treasury might be threatened with bankruptcy—he would think time properly employed in wrangling over the amount which will be a task beyond the power of the art critic who may chance to hold it in low esteem; and if he can "make things right" with his constituents by doing good party work and occasionally introducing a bill to further some "job" in which the electors of his State take an interest, he feels that he has done his whole duty as a member of the National Legislature. 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Thousands of men discharged from two to three months ago have been taken on again, and employers are generally paying wages in currency. Throughout New England the improvement is said to be very decided, and for every stoppage of work now reported we hear of several resumptions. From Philadelphia we hear favorable accounts; Cincinnati and Chicago report satisfactory progress toward complete recovery, and from dozen smaller cities we hear the same good news. Evidently the winter will not prove as hard a one for the working classes as was feared, and the settlement of accounts at the end of this year will develop more of general commercial and financial soundness than is usually seen after a sweeping and disastrous panic.

As to the immediate future, it is impossible to speak with confidence. The manifest indisposition of Congress to afford relief, by authorizing an increase of national bank notes and an extension of banking facilities, is a serious disappointment, and cannot fail to exercise an unfavorable influence upon the future of trade and manufactures. But whatever it may or may not do, we share the belief that, as compared with this year, 1874 will be a year of great and general prosperity. At all events, there will be but little regret felt in business circles when the new date replaces the old one and the year of the panic is past.

An Iron and Steel Consumers' Association Proposed.

The Boston *Journal of Commerce* labors under the strange delusion that there is no community of interest, so far as protection under the tariff is concerned, between American manufacturers of steel and American consumers of steel. It says:

It is difficult to realize that the consumers of iron and steel who represent interests of great importance in the country could not, in an organization to especially promote and guard their interests. The manufacturers of iron and steel are thoroughly organized and united, and through their indefatigable and persistent efforts the consumers are exorbitantly taxed to support their interests. Certainly the consumers of iron and steel should present a similar organized force to combat their high tariff views, if they would obtain any relief from the grievances which have been so ably ventilated in our columns.

No doubt the consumers of steel who have so ably ventilated their grievances in the columns of the *Journal*, would like to see the duty on steel repealed, under the mistaken idea that they would thereby get their raw material cheaper; but were the duty on foreign manufactures of steel repealed with it, they would soon have but little occasion for congratulation. If there are any trades which need protection, it is those which manufacture steel goods in competition with British and Continental manufacturers and exporters. Writing foolish letters to newspapers is a very easy, and doubtless a very pleasant, occupation for some people, especially when the writer's identity is hidden behind such a signature as, "Consumer," or "Manufacturer," or "Justicia;" but we doubt if there are many genuine consumers of steel who would voluntarily put their heads under the free trade guillotine for the sake of securing the repeal of the tariff on their raw materials. If there are, we should be pleased to know their names, and if the Boston *Journal of Commerce* will print the list of members of its new association, we will copy it for the information of all whom it may concern. We think we can accommodate the list without surrendering much valuable space.

#### Iron Steam Colliers.

The steamer *Reading*, launched on the 16th inst. from the yard of Messrs. Cramp & Sons, Philadelphia, is the first of a fleet of six iron colliers to be built for the Reading Railroad Company. These steamers will be of 1500 tons burden each. Two smaller vessels are building at Chester for the same purpose, and the company have several already afloat, varying from 500 to 1000 tons capacity. The aggregate capacity of the fleet, when all the vessels now building are completed, will be 15,400. It is the intention of the company to increase the number of their colliers until there are fifty iron steam colliers afloat. These vessels will mostly be employed in carrying coal to the New England ports. This enterprise is an important one, and of its success there can, we think, be no question. Iron steamers are far better than wooden vessels for this traffic, and steamers are incomparably better than sailing vessels, as they can be run upon time at all seasons, and maintain a continuous service between Port Richmond and the New England coast.

#### British Iron and Coal Statistics.

The monthly report of the Bureau of Statistics, for July, just received, contains the following interesting statistics of British iron production and export, which come to the Bureau as official and trustworthy:

IRON PRODUCED, EXPORTED AND LEFT FOR CONVERSION INTO BAR IRON, STEEL MANUFACTURES, &c.

Pig iron produced. Pig iron for conversion exported, into bar, and in Britain.

\* Three tons of coal is the average quantity used

In making a ton of pig iron. This quantity includes coal used in blast furnaces, pig iron, &c.

\* Three tons seven cwt. is the average quantity of coal used for converting a ton of pig iron into bar and finished iron, every operation included.

† Estimated by Messrs. Berger, Spence & Co., Manchester.

IRON—PRODUCTION OF GREAT BRITAIN BY COUNTIES.

	1869.	1870.	1871.	1872.
Countries.	Tons.	Tons.	Tons.	Tons.
England	8,456,255	8,738,627	9,379,470	9,510,000
Wales	839,502	1,021,888	1,087,809	987,696
Scotland	1,150,000	1,306,000	1,160,000	1,090,000
Total.	9,445,757	9,963,515	9,627,179	9,700,000

\* Estimated by Messrs. Berger, Spence & Co.

IRON—PRODUCTION OF GREAT BRITAIN BY DISTRICTS.

Countries.	1869.	1870.	1871.	1872.
Tons.	Tons.	Tons.	Tons.	
England	15,949	39,628	34,165	88,766
Northumberland	6,000	7,600	7,600	6,600
Yorks're.—N. Ridg.	766,410	912,070	1,292,000	1,100,114
W. Ridg.	105,785	77,717	114,549	148,636
Derbyshire	188,333	179,773	270,435	283,375
Lancashire	436,669	492,735	590,250	594,041
Cumberland	197,443	119,300	139,467	185,046
N. Staffordshire	321,913	308,378	268,900	275,925
S. Staffordshire	569,569	588,450	735,716	672,116
Lincolnshire	41,500	45,166	60,512	59,424
Gloucestershire	33,796	31,690	30,122	36,959
Wiltshire	—	—	—	45,626
Hampshire	81,306	93,601	99,997	44,255
Somersetshire	—	—	—	7,600
Total.	3,456,255	3,735,627	4,379,470	4,502,600

North Wales: Denbighshire and Flintshire.

South Wales: And, Frances: Glamorganshire.

Bit. Coal, Brecknockshire.

Districts, Monmouthshire.

Total.

839,509

1,021,888

1,087,809

1,040,727

Scotland.

1,150,000

1,306,000

1,160,000

1,090,000

Total of Great Britain.

5,445,757

5,963,515

5,627,179

6,728,387

\* The production of pig iron in 1872 (as in the three previous years) is the result of inquiries made by the Mining Record Office.

AVERAGE PRICES OF BRITISH PIG IRON FOR SERIES OF YEARS.

WEIGHTS OF IRON AND STEEL.



advances, but there is a difference in quality and much wider range in prices, that it is difficult to give quotations. There is little or nothing doing in Charcoal Irons, the high price, as compared with other Irons, at which they are held, curtailed their consumption; quoted at \$45 to \$50, 4 months, for warm, and \$60 to \$62 for cold blast. Blooms continue quiet, and quotable at \$90 to \$110, according to quality. The inquiry for Manufactured Iron is increasing, and the market, in view of the enhanced cost of the raw material, is growing stranger. Our manufacturers continue to fill regular orders from their customers for immediate delivery, on a basis of 2½ to 3%, net cash, and 3 cents usual time for Bars, but it is doubtful whether orders for future delivery could be placed at these rates. Some makers are quoting at 3% to 3½%, usual time, and refuse to sell for any less. The market is growing also firm, and steady, with Irons notwithstanding their high price. The market is also firm notwithstanding the high price of Irons, and the stocks are very much reduced, not only here but in the hands of jobbers and consumers, also, and a brisk trade is expected to open up about the middle of next month. The market remains unchanged at \$14.25, but actual selling prices may be quoted at \$13.90 to \$14.25, that is for immediate delivery—future delivery contracts could not be made under \$14.25. Orders for Bars continue to come in pretty freely, but the trade is not brisk. It is still firm, but unchanged. There is very little inquiry for Castings just now, but some of the foundries still have considerable unfinished work on hand. It was expected a few weeks since that there would be a further reduction in the card about the first of the year, but the reaction in the Pig Iron market will probably prevent this. The Window Glass trade continues dull, as it always is at this particular time, and stocks in Pittsburgh are not being so well exhausted for the present. Manufacturers are anxious to start up, but they have resolved not to do so until the blowers and helpers are ready to go to work at the reduction in wages, as they cannot pay the rates of last year and compete with any show of success with the East, where labor is cheaper. Discounts remain unchanged at 60 to 65 per cent, and hardly any of our manufacturers are able to fill a mixed order. It is said that two or three iron mills have been stopped for some weeks past, and are still in operation, but the market is not before, and it is also reported that the Window Glass factories will resume operations shortly. The general outlook at this writing is very favorable for a general revival of business next month; the indications are that there will be a heavy demand for all kinds of Pittsburgh manufacturers during the next three or four months.

The Pittsburgh *Commercial*, of Dec. 20, says: In our last report we expressed the opinion that putting the price of Gray Forge Iron at \$30 would check sales, and we could not expect the volume of business to be so large for some time as it was last week. This opinion has been confirmed, and though sales have been made at improved prices, the entire quantity sold does not amount to more than half of last week's sales. In addition to the lots reported below, we hear of sales amounting to 2150 tons at various prices, ranging from \$25 to \$30 per ton, 4 months, for good Gray Forge Iron, and \$30, cash, for Foundry.

**BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR ORE.**

800 tons Gray Forge	\$25.50	4 mos.
500 tons Gray Forge	28.00	4 mos.
400 tons Gray Forge, at furnace	25.00	cash.
400 tons Gray Forge, from yard	28.00	4 mos.
350 tons Gray Forge	28.00	4 mos.
300 tons Gray Forge, January delivery	30.00	4 mos.
200 tons Gray Forge	30.00	4 mos.
200 tons Gray Forge, January delivery	30.00	4 mos.
200 tons Gray Forge	28.00	4 mos.
200 tons Gray Forge	28.00	4 mos.
200 tons Gray Forge	28.00	4 mos.
200 tons Gray Forge	28.00	4 mos.
200 tons Gray Forge	28.00	4 mos.
200 tons Gray Forge	28.00	4 mos.
200 tons Gray Forge	28.00	4 mos.
150 tons White and Mottled	25.00	cash.
100 tons Close Gray	25.00	cash.
100 tons Gray Forge	27.00	4 mos.
100 tons Gray Forge	32.00	4 mos.
20 tons No. 1 Foundry	29.00	4 mos.
20 tons No. 2 Foundry	30.00	4 mos.

#### ANTHRACITE.

**BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR ORE.**

20 tons H. B. Charcoal

**CHARCOAL.**

10 tons H. B. Charcoal

\$44.00 4 mos.

#### CINCINNATI.

Meers, Addy, Hull & Co., under date of Dec. 22, write us as follows: The improvement of demand noted in our last has not increased, but there is still a noticeable inquiry, and the low prices offered have resulted in a few sales. Hanging Rock Charcoal brands firm at quoted price.

#### HOT BLAST CHARCOAL.

Hanging Rock No. 1. 1 ton. \$38.00 @ 40-00-4 mos.  
" " " 35.00 @ 37-00-4 mos.  
" " " Forge 30.00 @ 31-00-4 mos.

Tennessee No. 1. 30.00 @ 30-00-4 mos.

Alabama No. 1. 38.00 @ 39-00-4 mos.

Missouri No. 1. 40.00 @ 41-00-4 mos.

" " " No. 2. 37.00 @ 39-00-4 mos.

#### HOT BLAST STONE COAL.

Missouri No. 1. 1 ton. \$37.00 @ 36-00-4 mos.

Forge 30.00 @ 31-00-4 mos.

Ohio No. 1. 35.00 @ 37-00-4 mos.

" " " Forge 29.00 @ 30-00-4 mos.

Scotch Pig, No. 1.

#### COLD BLAST CHARCOAL.

Hanging Rock Car Wheel \$1.00 @ 65-00-4 mos.

Missouri " 65.00 @ 60-00-4 mos.

Kentucky " 63.00 @ 65-00-4 mos.

Tennessee " 58.00 @ 60-10-4 mos.

Georgia " 60.00 @ 62-00-4 mos.

Alabama " 60.00 @ 62-00-4 mos.

Machinery and Forge. 55.00 @ 57-00-4 mos.

Blooms. 105.00 @ 110-00-4 mos.

#### CLEVELAND.

CLEVELAND, Dec. 16, 1873.—No actual changes are to be noted in the quotations for the past week, but the market is still in a quiet, feeling, and holder, and refined prices which would have been welcomed a fortnight ago. Ore is steady in price, although it is not expected to share in the advance now anticipated in Pig Metal. Quotations are merely nominal.

**LAKE SUPERIOR CHARCOAL FOR CAR WHEELS AND MALLEABLE IRON.**

No. 1. \$47.00 @ 4 mos.  
No. 2. 47.00 @ 4 mos.  
No. 3. 50.00 @ 4 mos.  
No. 4. 53.00 @ 4 mos.  
No. 5. 55.00 @ 4 mos.

**COAL BLAST CHARCOAL—ANTHRACITE.**

No. 1 Onondaga. \$39.00 @ 4 mos.

**BITUMINOUS IRON FROM ALL LAKE SUPERIOR ORE.**

No. 1 Foundry, accdg to brand. \$37.00 @ 4 mos.

No. 2 " " " 33.00 @ 4 mos.

Forge. 30.00 @ 4 mos.

**BLACKBAND IRON FROM WARBURG—SCOTCH.**

No. 1 Glengarnock. \$42.00 @ 4 mos.

No. 1 Eglington. 48.00 @ 4 mos.

No. 1 Ayresome. 40.00 @ 4 mos.

#### AMERICAN.

No. 1 Massillon. @ 40-00-4 mos.

No. 1 Volcano. @ 40-00-4 mos.

#### IRON ORE.

Lake Superior special. 7.50 { bal. 4 mos.

The above quotations are for new mines; old are all sold up.—*Iron Review.*

#### BOSTON.

BOSTON, Dec. 20, 1873.—The demand for Redined Bar Iron is dull. Prices are irregular, and the poorer grades are selling at very low figures. Reports from the mills show increased firmness, and the best Iron cannot be bought of producers nearly as low as a few weeks ago. Pig Iron is quiet, but prices of American are firm and tend upward. Nails are dull and unchanged. We quote \$1.00 for 100 lbs. American Pig Iron at \$35 to \$45 per ton, including No. 2 extra at \$35 to \$37, and No. 1 at \$38 to \$40. We quote Eglington at \$47, Colines at \$50, and Charcoal at \$55 to \$65. American and English Refined Bar are selling at \$75 to \$85 per ton for the ordinary sizes, and \$90 to \$95 for extra sizes, according to size. Cast Steel is selling at 16c. per lb. for English gold, 17½c. for navy, and 18½c. to 19c. for American, currency, with fair balance of French selling at 17c. gold. Anchors are selling at 8½c. per lb. Chain Chains, 7½c. to 16c., from 3½ to 14 in. Boiler Plates remain steady. We quote at 7c. to 7½c. for Flanges, 5c. to 5½c. for C. No. 1, and 4½c. to 5c. per lb. for common and Tank.

Russia Sheet is steady at 18c., gold, and 19½c. to 20c. currency, for perfect lots. English and American do. is very firm and selling at 7c. to 8c. per lb. currency. Galvanized Sheet Iron remains steady and quiet at unchanged prices. We quote No. 20 at 11c.; Nos. 21 to 24, 12c.; 25 and 26, 13c.; 27, 14c.; 28, 15c. Nails are fair demand, with sales at \$1.75 for 100 lbs. Horse Nails, 35c. for No. 7.—*Iron Review.*

#### LOUISVILLE.

Mr. Geo. H. Hurl, under date of Dec. 22, writes as follows: The market is not so much disposition to press Iron on the market at the extreme low figures of last week, and prices are more steady. The usual time, four months, is allowed on quotations below:

#### HOT BLAST CHARCOAL.

No. 1 F'dry, from Hanging Rock Ores. \$38.00 @ 40 mos.  
" " " " 33.00 @ 35 mos.  
1 Forge, " " 29.00 @ 30 mos.  
1 F'dry, from Tennessee Ores. 34.00 @ 38 mos.  
2 " " 32.00 @ 34 mos.  
1 Forge, " " 29.00 @ 30 mos.  
1 Forge, from Alabama Ores. 34.00 @ 40 mos.  
1 Iron Mountain Ores. 40.00 @ 43 mos.

#### HOT BLAST STONE COAL.

No. 1 F'dry, from Missouri Ores. 34.00 @ 36 mos.  
" " " " 32.00 @ 31 mos.  
1 Forge, " " 28.00 @ 30 mos.

#### COLD BLAST CHARCOAL.

Car Wheel from Hanging Rock Ores. 60.00 @ 62 mos.  
" " " " 58.00 @ 60 mos.

#### IRON PRODUCTION.

1860. Centners. 1871. Centners.  
Ores. 9,292,978 15,215,559  
Ores and sea or turf iron. 523,643 370,784

Total ores. 9,813,616 15,586,373

Raw iron, in pigs. 4,231,246 6,802,026

Castings made at high f'res. 123,144 136,988

Total raw iron. 4,353,390 7,024,411

Bar, band, nail & wire iron. 3,219,659 4,415,511

Bessemer steel. 189,000 94,968

Other steel. 154,325 144,322

Plate iron. 569,933 337,502

Nails. 144,322

Tools and other manufac- tures of iron. 337,502

Total, 20,419.

#### Steel Direct from the Ore.

We find the following at the conclusion of an able paper lately read by Sir F. C. Knowles before the British Society of Arts:

A recent communication from Yeddo reports satisfactory progress in the development of a scheme of technical education in Japan, which was entrusted a few months ago to Mr. Henry Dyer, C. E., late of Glasgow, and his professional colleagues. When these gentlemen arrived in Japan, they found the arrangements to be in a more backward state than had been anticipated, the buildings intended for the Imperial College of Engineers, although in progress, not being nearly finished. It may be remembered from a former notice which appeared in our pages regarding this important educational institution in the far East, that Mr. Dyer was appointed to the conjoint offices of Principal and Professor of Engineering; and it is to that gentleman that the entire work of organizing the engineering college was entrusted. Soon after reaching the scene of his future labors, Professor Dyer presented the authorities with a general scheme of technical education, which was at once accepted by them in every detail. That scheme gave them an enlarged notion of what a college of engineering ought to be, in order to be suitable to the growing wants of the Japanese Empire; and in accordance with that scheme Professor Dyer, since his arrival in Japan, has designed a building for the college, which will, doubtless, be worthy of the name by which it is henceforth to be known, namely, the "Imperial College of Engineering." When the college is finished, which it is expected to be in about two years, the building which is now being erected will be converted into a technical museum, and, in the mean time, while the building is in process of erection, a house which formerly belonged to one of the Daimios has been secured as the temporary premises for holding such classes as have been formed. The official opening of the college will take place on the 3d of January next, and it is expected that the Emperor of Japan will be present on the occasion. At an entertainment given to the Emperor, that gentleman took great interest in all the details of the college, and congratulated his guest upon the scheme which he had devised; and notwithstanding the ultra-officialism which has generally to be encountered by those persons who require to come into contact with the Japanese authorities, Professor Dyer has had the good fortune to get from them everything that he asked, in order to complete the important educational undertaking in which he is engaged. In addition to the college he has designed a large chemical laboratory, and a workshop in which the young Japanese students will be practically trained in the principles of engineering construction.

**STEEL.**

Brown Wm. Roche Bros. & Co. Scrap, lbs. 8101  
Order. Sheet, pkgs. 408  
Scrol, bds. 36  
Hairs, 12c. to 18c. 211  
Flat plates, bds. 450  
Pig, tons. 700  
Cotton tiss., bds. 4000

**IRON.**

Brown Wm. Frasse P. A. & Co. Mds. pkgs. 2  
Fisher & Hitterchans. Cases, 3  
Hoffman Bros. Cases, 1  
Hulger E. & Sons. Cutlery, pkgs. 3  
Jackson R. D. Casks, 1  
Long J. E. & Co. Cases, 1  
Merwin, Hubert & Co. Guns, cs. 2  
Patterson Bros. Packaged, 3  
Quackenbush, Townsend & Co. Casks, 1  
Schröder J. H. F. Cases, 3  
Sawyer John. Wire rope, coils, 2  
Schoeveling & Daly. Arms, cs. 19  
Turner R. A. Nails, bds. 10  
Van Wart & McCoy. Mds. pkgs. 1  
Ward A. Mds. pkgs. 4  
Weckherlin H. Cases, 8<br



## THE NICHOLSON FILE.

All Nicholson Files are cut with the Patent *Increment Cut*, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly *expanding or increasing in size and space from the point*, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will not be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of Increment Cut File, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "Increment File" is not an experiment, but an established fact, and already has acquired a legitimate demand for upwards of 500 dozen per day. We employ no regular *Travelers*, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

**NICHOLSON FILE COMPANY,**  
Providence, R. I.

## CAUTION.

It has just come to our knowledge that certain parties in the West are engaged in buying up WORN OUT FILES of our manufacture, and, after immersing them in an acid bath, selling the same in packages which have a label of the same color and general appearance as ours, and falsely stating as follows:

**NICHOLSON FILES,**  
Providence, R. I.

Increment Cut.

Made from Best English Steel, &c.

Our friends and the public are cautioned against this deception, which we consider one of a most injurious character, not only to ourselves, but to all dealers and consumers who desire the

"NICHOLSON" FILES

as we produce them, as files so

1816. 1844. 1850. 1868.  
H. F. F. H. F. F. & SON. P. A. F. P. A. F. & CO.

**PETER A. FRASSE & CO.,**

95 Fulton Street, New York,

IMPORTERS OF

**Stubs' Steel Wire, Files and Tools,**  
Grobet Swiss Files,

Extra Quality English Spring Steel Wire,

Nos. 1 to 34.

Steel Wire for Sewing Machine Needles and for other Purposes,  
French Cold Rolled Sheet Steel,

Sizes, 22 to 36 Gauge.

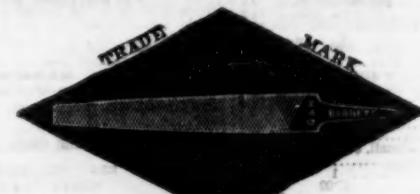
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The only Agents in the United States for

HUBERT'S CELEBRATED FRENCH EMERY PAPER.

For Hatters' and Machinists' Use.

**Black Diamond File Works.**



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Butchers' Cleavers,  
Bush Hooks, all patterns,  
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Grub, Garden & Planters' Hoes,  
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Hartie, Wiley & Co. William McNeice.  
Vulcan Horse Nail Co. Langstroth & Crane.  
Walsh & Bro. Keystone Manufacturing Co.  
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Stocks and Dies.

## New York Wholesale Prices, December 23, 1873.

## HARDWARE.

## METALS



## Metallurgical.

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ENGINEERS,  
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The subscriber will sell exclusive rights, for separate States, to manufacture Wrought Iron and Steel by his patent processes, and take payment in part interest in the business, and will erect Blast furnaces and Wrought Iron and Steel works when required (for manufacturing by his processes), upon the most approved models in this country and Europe.

These processes produce "from ordinary coke pig iron the purest iron ever made," which is equal to the highest class Swedish and Norwegian Irons for Casting and tools, and to Low Melt Iron for engineering purposes, and at less than one-half the cost of those irons.

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Exclusively for the Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags & Coal for Practical Metallurgical Purposes.

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This Laboratory was established in 1866, at the instance of a number of practical iron-masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

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For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12.50  
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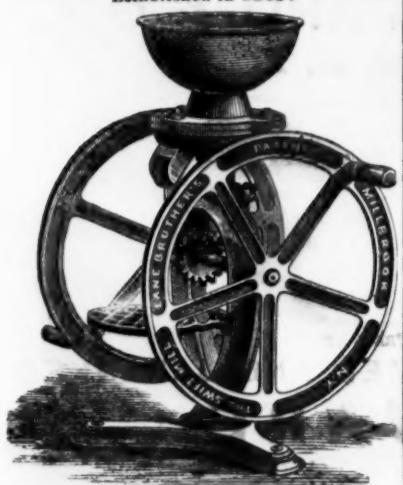
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For admission candidates for a degree must pass an examination in Arithmetic, Algebra, Geometry and Plane Trigonometry, and in Chemistry, and those who are admitted must pass an examination, and may pursue any or all of the subjects taught. The next session begins October 2nd. The examination for admission will be held on June 25th and September 2nd, 1873. For further information and catalogues, apply to

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Letter "B" Geared Counter Coffee or Spice Mill.  
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Our Mr. L. Coes, formerly senior member of the firm of L. & A. G. Coes, established in 1839, is the Original Inventor of the Screw Wrench, and has, by making the bar wider, where the strain comes most severe, and screwing a nut up firmly against four square shoulders inside the ferrule, thereby effectively preventing the ferrule from being thrust back into the handle or getting loose, and making a larger screw than in the old wrench, fully succeeded in making a 12 inch wrench stronger than a 16 inch made in the usual manner. All sizes are made in this way, and are undoubtedly the strongest and best finished Screw Wrenches in the market.

There are *Imitations* of our goods offered for sale, that, without question, infringe on our Patents.

We hold Patents bearing date Nov. 10th, 1863 (re-issued June 1st, 1869), June 26th 1866, March 23d, 1869 (re-issued April 19th, 1870, and May 14th, 1873), which fully cover all our improvements. One of the above cuts represents a sectional view, showing the nut under the ferrule, and the strengthened bar, that part being covered by the aw, as seen in the cut of wrench complete. None genuine unless stamped

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Parties ordering from the New England  
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L. COES & CO.,  
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Exclusive Manufacturers of the



In Appearance the Most Beautiful. In Action the Most Graceful. In Use the Most Reliable.  
The Challenge Springs are manufactured from Steel Wire, tempered by an Improved Process, the result of repeated experiments, and must not be classed by dealers with the numerous worthless "Coil Springs" made from common Bed Spring Wire.

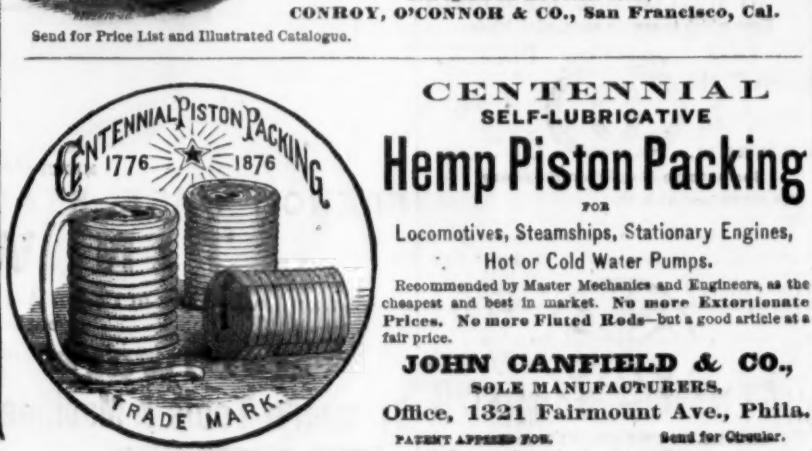
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Biddle Manufacturing Co.,  
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Hardware Specialties, Fine Tools,  
IMPROVED HAND AND POWER DRILL PRESSES, AND HAND  
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PATENT APPLIED FOR.



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THE CORRUGATED STOVE PIPE ELBOW,  
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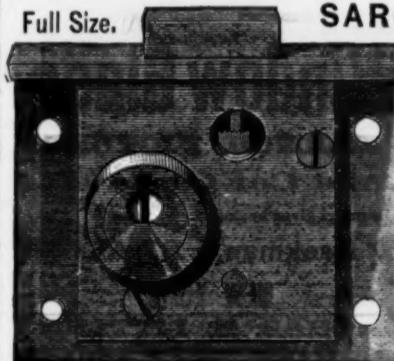
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SARGENT & GREENLEAF'S

Celebrated

UNPICKABLE LOCKS.

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PORTABLE AND STATIONARY

## ENGINES AND BOILERS.

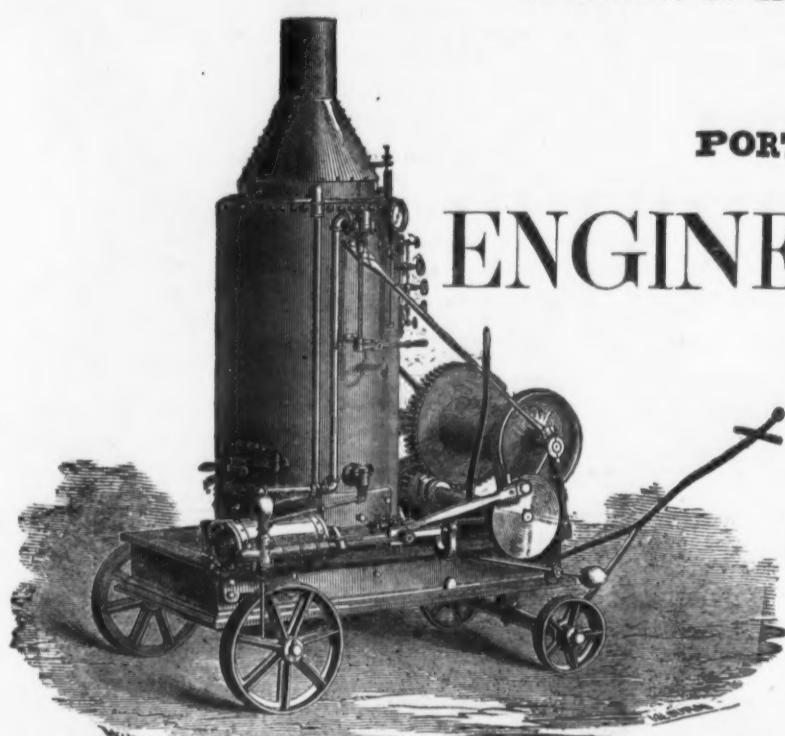
### SAW AND GRIST MILLS.

### WATER WHEELS,

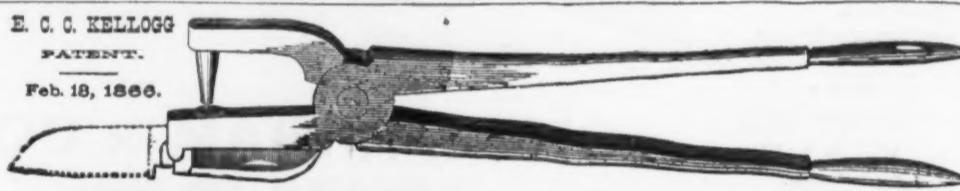
### PORTABLE HOISTING ENGINES, &c.

Works at NEWBURGH, N. Y.,

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E. C. C. KELLOGG  
PATENT.  
Feb. 18, 1866.



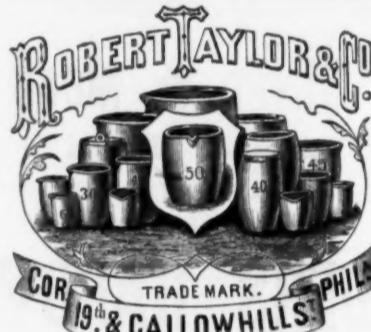
### COMBINATION BELT PUNCH,

Pronounced by those who have used them the handiest and most desirable tool in use of its kind. As will be seen, the combination consists of  
BELT PUNCH, KNIFE AND AWL.

Also, NEEDLE for Lacing Rubber Belting, so combined that each tool does its specific work and not interfere with either of the others.

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### BLACK LEAD CRUCIBLES

Of all Sizes and Forms for melting

Steel, Brass, Gold, Nickel and all kinds of Metals.

Mr. Robert Taylor having been for seven years the head of the late firm of Taylor, Strow & Co., and also a practical mechanic, who understands thoroughly the details of the manufacture, we solicit a continuance of the favors hitherto extended to him.

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### SUPERIOR BLACK LEAD CRUCIBLES

For Melting Steel, Brass and other Metals,

And Crucibles for Hardening Files.

Also any size or shape made for

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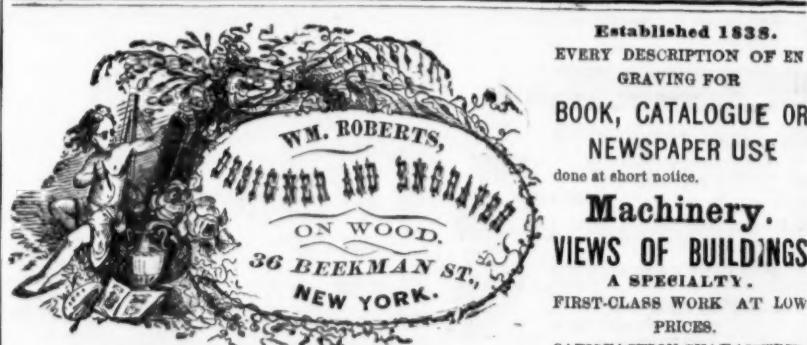
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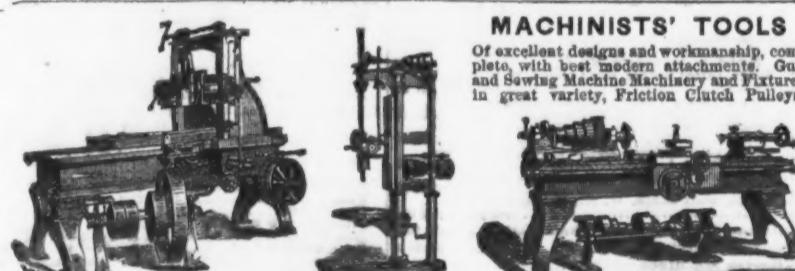
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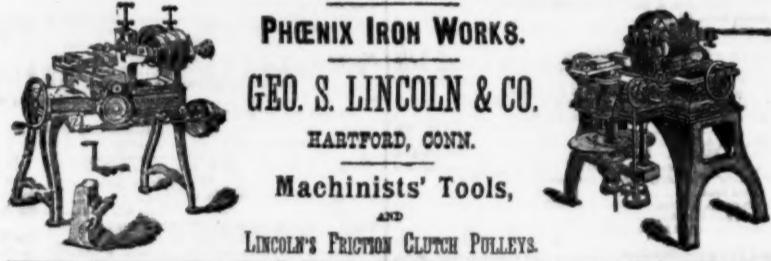
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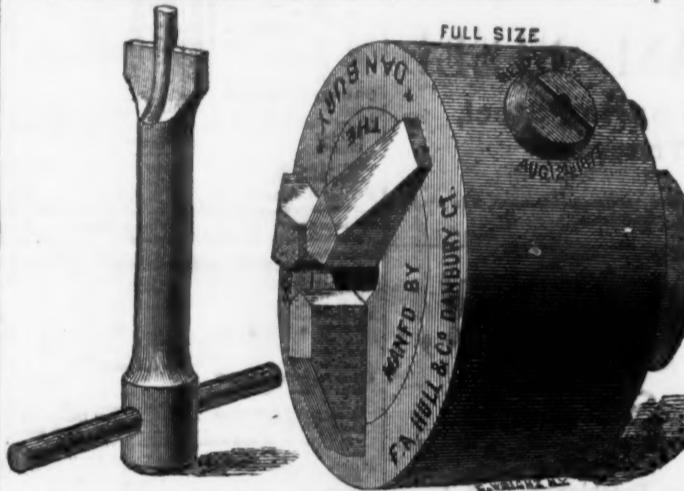
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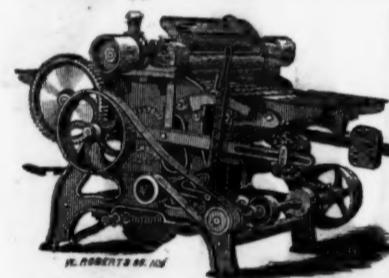
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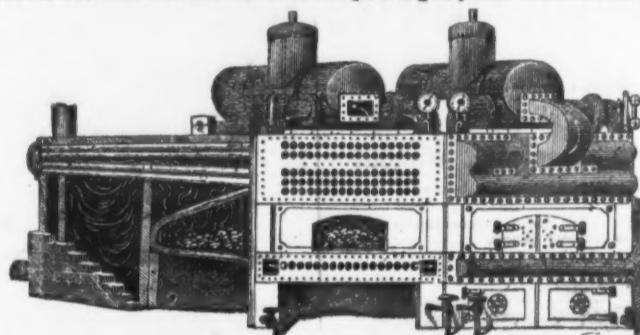
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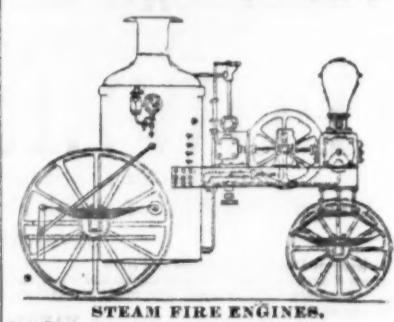
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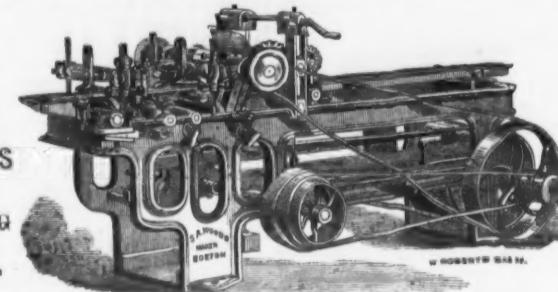
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